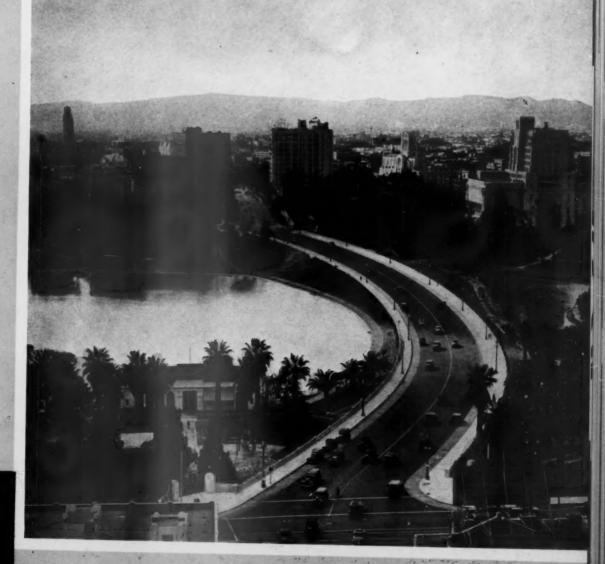
MINIOURIESS JOURNAL

EPTEMBER, 1938



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Vol. 24

SEPTEMBER, 1938

No. 9

The October issue will bring you full details on the 5th Annual Metal Mining Convention and Exposition, plus a fine group of articles including:

Gold Mining at the Haile Mine in South Carolina

Rehabilitating the Isle Royale Copper Mine Core-Drilling the Zenith Shaft

on the Vermillion
Operations at the Cloverdale

Quicksilver Mine
Development of New Uses for
Silver

McKinlay Entry Driving Machines at New Orient Mine

Convention plans to date are shown on pages 45 to 49. JOIN THE THRONG that have already made reservations to attend!

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Vol. 24

SEPTEMBER, 1938

No. 9

Richard J. Lund, Editor

MECHANIZATION IN RAW MATERIALS

PTO the present, most of the discussion that has been widely publicized concerning displacement of workers by mechanization has dealt with its effect in manufacturing industries. Little has been written directing public attention to effects of the same general problem in industries producing raw materials.

Of all raw materials used in manufacturing, minerals constitute the lion's share. By and large, it is recognized that adoption of modern mining methods has resulted in a greater output per man employed, thus permitting lower costs where other conditions are unchanged, and offsetting increases in cost due to unfavorable physical conditions such as increasing depth, lower grade of ore, and thinner seams.

Had modernization not made such progress, it is more than probable that the higher costs necessitated by increasing physical handicaps would have invited wholesale substitution by other raw materials that might perform the functions of minerals in industry almost as efficiently. An alternative result would have been a broad increase in costs of minerals used in manufactured goods, thus increasing their prices to the ultimate consumer and hence restricting their use to an ever shrinking demand.

Without present-day advances, bituminous coal might have to sell for \$5.00 per ton at the mine, copper for 25c per pound, iron ore for \$10.00 per ton, lead for 12c per pound, etc. The effect on manufacturing industries would doubtless be to increase consumer prices, narrow markets, and hence decrease employment within those industries themselves.

This is one aspect of mechanization in raw material industries that appears to have been neglected. Modernization of mining, with resultant increase in output per man, has largely enabled the industry to retain its markets against competitive materials, thus keeping thousands of men at work, and to furnish

manufacturing industries with raw materials and power at prices that permit low cost and broadening use of their finished goods.

THE MENACE TO COAL MINING

A S IF our heavy employing industries, anthracite and bituminous coal, did not have enough trouble, they are now faced with the threat of a flood of cheap fuel oil from Venezuela to further demoralize their markets.

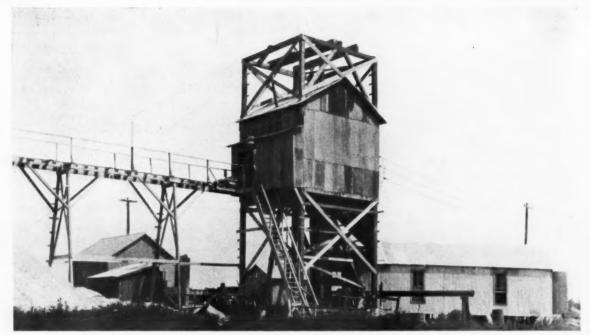
With the enormous strides made by oil in domestic, industrial and transportation fueling, the reduction in duties on foreign oil is a menace to the solid fuel industry, to its 650,000 mine workmen, the thousands engaged in coking and distribution, and to the hard pressed railroads. Oil is the chief export of Venezuela, and the pressure for reduction in the duty in the Venezuelan Trade Agreement soon to be negotiated will doubtless be strong.

Twelve and fifteen thousand foot drilling will supply abundant oil within the United States for many years. Venezuelan or other foreign oil is neither wanted nor needed. What is urgently needed is the work for the men and the mines of the anthracite and bituminous coal districts.

TELL THEM NOW

ROM now until the Congressional elections in November, and thereafter until the Senators and Representatives, chosen by the people to represent their interests in the United States Congress, depart for Washington, mining men should avail themselves of every opportunity to tell these legislators their views. It should be made crystal clear as to what is and is not wanted in forthcoming legislative procedure.

Most mining men favor continuance of present mineral tariffs, and even increases in some instances. They desire economy in government, reasonable taxation, repeal or modification of the National Labor Relations Act, and full right of mineral location and entry on the public lands. They are definitely opposed to punitive and unsound taxation, excessive Federal spending, abuse of citizens' rights by the National Labor Relations Board and restriction of mining rights on the Federal Domain. Real help can and should be given now to Senators and Representatives by telling them the viewpoint of mining on matters of Federal action.



Surface plant used in sinking the Garrett shaft

Sinking Eagle-Picher's NEW GARRETT SHAFT

THERE was considerable comment in local mining circles when Eagle-Picher announced they would sink a shaft into the deep Reed Springs formation on the Garrett land, five miles north of Picher, Okla., and more than a mile north of any previous development work. The method to be followed in getting down what was to become the deepest shaft in the district was one of much discussion.

Experience had taught, on many occasions, the difficulties, time and expense of sinking through heavy water, such as was expected here, because of the necessity of moving heavy equipment downward as the work progressed. It was realized that a single power interruption at a crucial time might set back the work for weeks or even months, and a better method was therefore sought. A method frequently used in the district, involving draining the ground through a vertical turbine pump installed in a

• Cement Grouting Effective in Holding Water Inflow to Minimum

By N. E. RITTER & R. J. STROUP

Eagle-Picher Mining & Smelting Co.

large drill hole near the proposed shaft, was likewise abandoned. The method finally chosen consisted of pumping cement grout into the ground through drill holes, thereby sealing all water-bearing crevices and thus enabling the shaft to be sunk practically dry.

There was nothing new or original about the idea. It seemed the logical procedure, but the skeptics were many. The *quantity* of water was immaterial to the method; but it was realized that the grouting would have to withstand

110 lb. per square inch of pressure at the 439-ft. level, this being the bottom of the sump for a drift to be cut out at 435 ft. The water level is about 180 ft. below the surface.

Drill Hole Selected as Shaft Site

A churn drill hole about 100 ft. west of the ore run was selected as the shaft site. The log of this hole showed but a few small openings, no ore, and appeared to be a good location. It

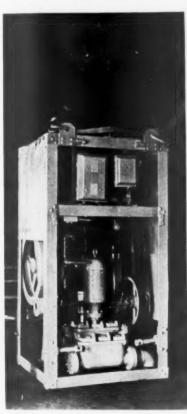
was believed that the majority of the grouting work could be done from this drill hole, and the smaller cracks and crevices filled locally by pumping cement into machine drill holes kept ahead of the work.

Cement Grouting Sealed Water Off Down to 388 Ft.

Cement pumping equipment of the Halliburton Oil Well Cementing Co. pumped 3,791 sacks of cement into this hole. At the end of the pumping a pressure of 2,000 lb. per square inch was reached.

A sinking derrick was constructed, equipment installed and a 5-ft. x 9-ft. shaft was started on September 16, 1937. Work progressed uneventfully until December 2, 1937, when at a depth of 388 ft. water was encountered.

A churn drill rig was set over the shaft, the hole was spudded in to about 5 ft., the casing anchored tight, and, as soon as the cement set, the hole was deepened to 465 ft. A Halliburton machine was called again, and pumped 2,522 sacks of cement before a pressure of 2,000 lb. built up. It was allowed to set 72 hours before the



Triplex pump and motor mounted in frame for handling seep water



A Halliburton comenting unit of this type was used to seal off the main flow of water

hole was drilled out to test the water tightness. Some water developed, and 18 more sacks of cement were pumped.

On February 5, 1938, sinking was started again. Two rounds were shot and no water was encountered. Some water developed after the third round, which required 26 sacks of cement to seal off.

Permanent Cement Pumping Equipment Installed

Meanwhile realizing that the major crevices were filled by the Halliburton machine and that there would be numerous minor crevices to fill, permanent cement pumping equipment was installed. A 1½-in. line was placed in a corner of the shaft connected to a 1½-in. Gardner steam pump on the surface. The pump suction was placed in a box prepared for mixing cement and water. This equipment proved successful in closing the small openings.

It was found as the work progressed and the shaft was cut down through the cemented crevices that the shrinkage of the cement in setting left openings at the top varying from paper thickness, from which a sheet of water sprayed, up to 3/4 in., where the concrete was about a foot thick. The larger openings were regrouted and the smaller ones filled by driving in white pine shingles. It must be remembered that as the work progressed, the static water pressure rose gradually to 110 lb. per square inch when the shaft was bottomed. Meanwhile the shaft was making more water with every foot sunk. The inflow was around 20 gal. per minute in spite of all that could be done.

Bail and Triplex Pump Added to Handle 200 Gal./Min.

It was decided then that we should prepare to handle a reasonable amount of water, possibly up to 200 gal. per minute, if that should be necessary. To accomplish this, the geared air sinking hoist was changed out for a 75-hp. electric hoist with a 100-gal. valve-bottom bucket. This equipment proved itself capable of easily handling one bucket of water from near the bottom of the shaft every minute. In addition to this, a 3-in. high-pressure triplex pump connected with a V-belt to a 15-hp. motor was installed in an angle iron frame made to swing in the shaft and was capable of handling another 100 gal. per minute. This sinking pump hung in one end of the 5-ft. x 9-ft. shaft on a 3/4-in. cable without interfering with hoisting. An air-powered crab raised and lowered the pump when shooting.

How the Average Round Was Made

In general the procedure, round by round, was as follows: In order to be sure that the rock surrounding the shaft was effectively sealed against the water pressure on the outside of the shaft, 10 holes, each 10 ft. deep, were drilled each round on the rim and winged out so the bottoms would be about 3 ft. outside the shaft line. After a hole was started, a 1½-in. pipe was driven in and shingled tight with white pine shingles. The hole was then drilled out through the pipe. If water was encountered, the drill steel was removed, a stop cock screwed

(Concluded on page 44)

CALIFORNIA'S Commercial Minerals

T IS not mere native-son boasting nor exaggeration to state that California is remarkable for the number and diversity of her commercially valuable minerals. It is statistically true. That California signalled her entry into the company of mineral producers by announcement in 1848 of gold discoveries is a story already so well known that it needs no repetition here. Although she still continues to lead the States of our American Union in yield of the yellow metal, today she annually presents an imposing list of from 55 to 60 different mineral substances of which some economic production is made in greater or less amount.

When we are discussing or listing the "commercial" minerals, to what group shall we restrict the definition? Shall the metallic ores be included, or shall we restrict it solely to the nonmetallic or industrial list? A gold ore that can be mined and beneficiated at a profit is certainly "commercial." Or take the case of chromite: While in part it is a source of the metal chromium for ferro alloys and other industrial purposes such as plating, by far the larger part of the tonnage is annually consumed in refractories for lining metallurgical furnaces. In addition, chromite is utilized as a source of chromic acid for certain industrial chemicals, notably the chromates for leather tanning. The oxides and chemical salts of certain of the metals have various industrial applications not involving reduction to the metallic state: Bauxite, the principal ore of aluminum, is used also in certain types of portland cement; the trioxide of arsenic is an important constituent of insecticides; important tonnages of manganese dioxide are utilized in drycell electrical batteries and for counteracting in glass manufacture the green color due to even small perBy WALTER W. BRADLEY

Chief of Division of Mines Department of Natural Resources of California



• State Is Blessed With An Abundance and Diversity of This Type of Material Unsurpassed by Any Other Equal Area

centages of iron; certain mercurial salts are essential in the medical and chemical fields, and titanium oxide has attained to a special place in paint manufacture.

"Commercial Minerals" Restricted to Non-Metallic Group

However, we generally think of the term "commercial minerals" as applying to the non-metallic group, and will here so limit our story, excluding also the fuels-petroleum, natural gas and coal. California has an abundance and diversity of these not surpassed by an other equal area, certainly not on this North American continent, and I doubt if elsewhere. The statistical report of the State Division of Mines for the calendar year 1936 (the latest with detailed figures available) shows commercial production in that year of 44 different substances in the non-metallic list. These are segregated for convenience of reference and as indicating their primary uses or character into structural materials, industrial materials, and salines.

Structural Materials

This group, as the name implies, includes those materials involved in construction and building operations, such as bituminous rock, brick, cement, lime, magnesite, slate, crushed rock, sand and gravel, and the several building stones—granite, marble, sandstone, onyx and travertine.

In the earlier days of the oil industry in California considerable asphalt was produced from outcroppings of oil sand and was a separate industry from the production of oil itself. Today most of the asphalt comes from the oil refineries, which yield better and more uniform grades. Such natural asphalt as is at present mined is in the form of bituminous sandstone, and is recorded under that designation. Bituminous rock is still used to a limited extent for road dressing in Santa Barbara and Santa Cruz counties where there are available deposits. Some of the Santa Cruz material is marketed in a form which can be laid cold, and is therefore especially applicable and valuable for patch

Bricks of many varieties and in important quantities, as well as hollow building tile or blocks, are annually produced in California, and include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime and others. Not only do the plants here supply practically all of our own requirements but considerable quantities are shipped



Diatomite bricks are sawed out direct from strate in place at this plant of Johns-Manville Company at Lompoc, Calif.

to contiguous territory and in part over a wider radius. The annual value has varied between 2 and 7 million dollars during the past ten years.

Plentiful Gravel Supply for Healthy Cement Industry

There are ten plants in nine counties making portland cement, the annual value having reached as high as 26 million dollars, though the range has been from 8 to 18 millions during the past five years. The growth of the cement industry has carried with it corresponding growth and annual variations in the output of crushed rock, sand and gravel. A comparison of their production charts, graphically plotted, reveals an interesting parallelism. To list the kinds and varieties of rock utilized commercially under the heading of "crushed rock" would be to run almost the entire gamut of the classification scale. Much depends upon the kind available in a given district. Practically every one of the 58 counties of the State supplies at least a part of its crushed rock or gravel needs. In many localities, river-wash boulders form an important source of such material.

Combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations. Included in the sand and gravel figures is a measurable tonnage each year of molding sand, which in 1936 was 49,887 tens worth \$124,333

coming from ten pits in nine counties. The "miscellaneous stone" total has ranged between 7 million and 19 million dollars value annually during the past ten years, the low point being in 1933.

Granites Are Unexcelled

For building purposes the granite found in this State, particularly the varieties from Raymond, in Madera County, Rocklin in Placer County, and near Porterville in Tulare County, are unexcelled by any other similar stone found elsewhere, and the quantities available are unlimited. Gran-

ites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a finegrained, "silver-gray" granite of uniform texture and color, especially suited for monumental and ornamental work. "Black granite" of excellent color contrasts is obtained in Fresno, San Diego, and Tulare.

California and Washington have been the only important domestic sources of magnesite for many years. The Californian mineral is particularly adapted to plastic purposes, though an important part goes into refractories.



Gold is recovered as a by-product by sluices at this sand plant of Grant Rock and Gravel
Company, near Friant, Fresno County

The first commercial yield of this mineral here was in the latter part of 1886, and during the World War the value in a single year reached approximately two million dollars.

Sandstone Output Curtailed by Substitutes

Marble, onyx marble and travertine are produced in varying amounts, relatively small each year, though we have a number of fine varieties. This is true also of sandstone, of which there is an unlimited amount of highgrade material available and suitable for building purposes. However, the wide use of concrete in buildings of every character, as well as the popularity of lighter-colored building stones, has curtailed the output of sandstone almost to the vanishing point. Most of the output in the past few years has been utilized as flagstone in garden walks, in fountains, walls, and fireplaces, to give effect to Spanish and English types of homes.

Slate of excellent quality and in large deposits is available in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand in recent years has been light owing to competition of cheaper roofing materials.

Industrial Materials

The substances grouped arbitrarily in this list, as distinguished from those having a clearly defined classification such as metals, salines, etc., are in part, at least, mineral earths, and with four or five exceptions are as yet produced on a comparatively small scale. Yet, in the aggregate their annual value fluctuates around five million dollars.

The more important of these minerals thus far exploited, so far as shown by value of the output are: Barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, soapstone and talc, silica. Smaller amounts and values are recorded for asbestos, carbon dioxide, feldspar, fluorspar, gems, graphite, lithia, mica, mineral paint, andalusite - sillimanite - kyanite group, strontium, sulphur, wollastonite and zircon.

Barite mined in California is consumed in the manufacture of lithopone for paints, in heavy-gravity oilwell drilling-mud, fillers and barium paints. The top figure was 26,796 tons, \$168,829 value in 1929. California's production has, in part, been

of witherite, the only recorded yield in North America of the carbonate.

Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group, commonly known as rock soap. Fuller's earth includes many kinds of unctious clays. The two groups have some similar and overlapping uses, hence we combine their figures in our statistical reports. Production has come mainly from San Bernardino, Inyo, and Kern counties, with lesser amounts from San Diego, San Benito, Calaveras, Solano, Riverside, and Fresno.

Carbon Dioxide from Salton Sea

Natural carbon dioxide gas was first obtained commercially in California in 1894 from a drift on the 575 level of the Santa Isabel shaft of the New Almaden quicksilver mine, Santa Clara County. The drift was bulkheaded and a pipe placed in it through which the gas was drawn off, compressed in cylinders and used in the preparation of soda water. Since 1933, carbon dioxide gas is being produced from wells drilled on the edge of Salton Sea near Niland, Imperial County. It is condensed and converted into the dryice form, then shipped by truck to Los Angeles. The plant has a ca-pacity to make ten tons of dry-ice per day, but thus far apparently has operated at not over half that rate.

Pottery clay has been mined at one time or another in this state in 34 out of the 58 counties. Of these, 19 contributed in 1936. This refers to all clays used in the manufacture of red and brown earthenware, china and

sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra-cotta, sewer pipe, drain and roof tile, et al, and the figures recorded in the annual statistical reports of the Division of Mines for tonnage and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the marketable finished articles by the pri-mary producer. This group does not include clay used in making brick and hollow building blocks, which are listed among the structural materials. There are many other and important uses for clay besides pottery manufacture. Among such may be enumerated paper, cotton goods, and chemicals. During the past ten years the value of pottery clay in California has ranged between a quarter-million and one and one-quarter million dollars yearly, 382,823 tons worth \$646,920 having been the output in 1936. In the same year the market value of the manufactured products from this type of clay was \$9,886,209.

Lompoc Produces 70 Percent of Diatomite Output in State

Diatomite, or diatomaceous earth, is mined principally in Santa Barbara County at Lompoc, with smaller amounts coming from Monterey, Los Angeles, Orange, and San Luis Obispo. Deposits are also known in Fresno, San Benito, Kern, Shasta, Sonoma. The Santa Barbara material thus far has proved to be of a superior quality, particularly for filtration purposes, which brings higher prices. About 70 percent

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Barite mine of National Lead Company at El Portal, Mariposa County



Open cut operation of Western Magnesite mine at Red Mountain

Diatomite quarry of Johns-Manville Company at Lompoc

of California's output of diatomite is from a single operator.

Dolomite is utilized for steel-furnace flux and refractories (in part replacing magnesite), in plaster, stucco dashcoat, terrazzo, art stone, and for manufacture of CO2. Inyo and Monterey counties are our important sources.

Feldspar is an indispensable item in the raw-materials list for the ceramic industry; as is also silica, though the latter has a number of other important places. Feldspar is being obtained from San Diego and Fresno counties; silica from Contra Costa, Fresno, Placer, Riverside and San Diego. Silica is obtained in part as vein quartz and in part as sand, and is utilized in glassmaking and as an abrasive; to some extent it is used in fire-brick manufacture.

The production of gem materials in California has been somewhat irregular and uncertain since 1911, though for ten years previous it had been very active, nearly touching a halfmillion dollars value in 1906. The varieties include diamonds, jasper, garnets, kunzite, beryl, iceland spar, topaz, tourmaline, iridescent obsidian,

and opal.

Industrial limestone was produced in 1936 by 21 properties in nine counties to the amount of 295,792 short tons worth \$661,757. amount does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as a smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural "lime"), "roofing gravel," paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, facing dust for concrete pipe, and for rubber and magnesite mix.

Mineral water actually bottled for sale or for local consumption is widely produced annually in this State. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. From a ther-

Limestone is mined by shrinkage-stope at this operation of U. S. Lime Products Corp., at Sonora

apeutic standpoint, California is particularly rich in such spas. The value has averaged over a million dollars annually the past ten years, with the quantities bottled ranging between 12 and 37 million gallons.

Pumice is shipped for use in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes and for chicken-house litter. The volcanic ash or tuff variety is employed in making soap and cleanser compounds, as a concrete filled in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. Several counties contribute to the total tonnage which is not large as yet.

Pyrite is shipped mainly from Shasta County for the manufacture of sulphuric acid for explosives and fertilizers. The sulphur content ranges up to 50.8 percent.

Material for Spark Plug Porcelain

Andalusite mined in the White Mountains in Mono County is the 'spark plug ore" shipped to Detroit for inclusion in a nationally known brand of automobile spark plugs and other high-tension electrical porcelains. Kyanite is a similar aluminum silicate, from Ogilby, Imperial County, being utilized in the manufacture of refractories.

Talc for toilet powders, paint, paper, and rubber manufacture, and for ceramics use, comes from Inyo and San Bernardino counties. Soapstone grades used for roofing granules, and as a filler in roofing paper and in magnesite cement is mined in Butte, El Dorado and Los Angeles counties. The value has averaged around \$200,000 yearly the past ten years.



Stockpile of andalusite ("spark-plug ore") from mine of Champion Sillimanite, Inc., in Mono County, ready for shipment to Detroit

Salines

Borax and common salt have been produced in a number of localities in California, more or less regularly since the early 1860's. Except for a single year's absence, soda has been on the list continuously since 1894. Potash, magnesium chloride and sulphate, calcium chloride, bromine, and iodine have been added at intervals, the lastnamed in 1931.

California Leads World in Borax Output

Borax Lake in Lake County was discovered in 1856, and the deposit was Potash production began commerworked in 1864-1868, inclusive, the bulk of the product being exported by sea to New York. That was the first commercial output of this salt in the United States, and California is still the leading American producer of borax (as well as the world leader),

having been for many years the sole domestic source. Production has come in turn from the dry lake "playa" deposits of the desert region, then the colemanite beds, and today from the kernite (rasorite) deposits near Kramer in Kern County which have, since their discovery in 1926, displaced the other forms in commercial yield. The value has averaged in excess of four million dollars annually since 1927.

Bromine, as well as magnesium chloride and magnesium sulphate are by-products recovered from the saltworks bittern waters at Chula Vista on San Diego Bay, San Diego County, and at Newark, Alameda County, on San Francisco Bay. Iodine is obtained by treatment of waste saline waters from certain deep oil wells in the Long Beach field, Los Angeles County. cially in California in 1914, with a small yield from kelp, followed during the World War period by small amounts from salt-works bitterns,

from portland cement-plant dust, and from molasses distillery-slops char. The output today comes from the potash-bearing residues and brines in the old lake beds of the desert region, particularly Searles Lake, San Bernardino County. The yield has averaged over two million dollars value per year for the past ten years.

Salt From Ocean Water

Most of the common salt production of California is obtained by solar evaporation of water of the Pacific Ocean, by plants located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part rock salt). The output has averaged in excess of a million dollars annual value since 1922.

Sodium salts produced here include soda ash, trona, caustic soda, and bicarbonate, from Owens Lake, Inyo County; soda ash, salt cake, and trona, from Searles Lake, San Bernardino County; and in the past, salt cake from Carrizo Plains, San Luis Obispo County, and thenardite from Bertram, Imperial County on the shore of Salton Sea.

Summary

The estimated total value of the mineral production of all groups in California for the year 1937, detailed compilations of which are not yet complete was \$351,487,000. Of this, petroleum accounts for \$240,000,000, and gold \$40,740,000.

International Reopens Tooele Lead Smelter

International Smelting and Refining Company has resumed operations at its lead smelting unit at Tooele, Utah, closed down by the management on July 1 owing to low metal prices. The reopening will put 200 men back to work, and it is reported that enough lead ores have been accumulated to insure operation of the lead smelter for at least six weeks. The management hopes that the price of lead and zinc will encourage mine operators to increase their ore shipments to a point that will keep the smelter in continuous operation.

C. E. Weed, manager of mines for the Anaconda Copper Mining Company, of which International is a subsidiary, was recently in Salt Lake City for a conference with Frank W. Robinson, of Omaha, vice president in charge of traffic for the Union Pacific Railroad. They conferred on rate matters for new Anaconda developments near Pioche, Nev., and to inspect company properties in Tintic and other Utah mining districts. Mr. Weed reported that the \$1,000,000 Elton tunnel project, to connect the mines of Bingham with the Internation smelting plant on the other side of a range of mountains, will probably be completed in two years. A contract has been let for a test bore at the head of the tunnel to determine the depth of bedrock to find the best drainage method.

Owing to high water encountered in the bore and rapidly decreasing money appropriated, the work of driving the Elton tunnel was suspended in June. It was reported by officials of National Tunnel and Mines Company, Anaconda subsidiary in charge of boring the tunnel, that work on it would in all probability be resumed early in the fall. The company recently sold surface rights to lands located in upper Bingham to the Utah Copper Company for \$350,000, this land presumably to be used for dumping waste from the large pit operations. It is expected that this sum will be added to the tunnel fund.

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The Elton tunnel is in the mountain 6,100 ft., but still has 16,900 ft. to go before breaking into Bingham Canyon. When completed, it will provide direct and cheap transportation facilities from the mines in that district with the big International smelting plant at Tooele, effective drainage for most of the mine workings in the mountain, and additional revenue through sale of resultant mine water to agricultural interests in the vicinity.



MINING with DUCKBILL CONVEYORS on Pitching Seam

THE West Kentucky Coal Company is operating 10 shaking conveyors with duckbills in its No. 8 mine near Sturgis, Ky., working in the No. 9 Seam of coal which averages 4 ft. 10 in. in height and lies on a pitch of about 7 percent. The height and pitch are fairly uniform. The roof is of hard black slate and is generally very good, although there are a few basins or geological disturbances crossing the entire acreage in which the black slate is broken and tender. These streaks of bad roof extend parallel with the rooms and with the pitch of the seam, and usually cover from two to six rooms. Since the room advance is much faster with conveyors than with hand loading, it is possible to work rooms under much worse top; so far it has not been necessary to skip any

• Fine Performances Made In New Operation Working at Times Under Bad Roof

By DAVIS READ

Chief Engineer, West Kentucky Coal Co.

rooms. The bottom is hard fire clay, fairly uniform in grade and usually dry. The coal is considered a fairly hard bituminous coal with no very definite lines of cleavage, thus producing good sizes if properly shot. There are no consistent partings of impurities in the seam, but frequent streaks of pyritic and sulphurous material are met.

Entries Driven Along Strike and Rooms Up Pitch

It has never been considered practical to drive rooms or panel entries down the pitch, or to drive panel entries up the pitch because of the difficulty of handling the trips of cars with the locomotives on the 7 percent grade. The room entries are there-

or

fore driven on a slight upgrade across the pitch and the rooms are driven directly up the pitch to favor the shaking conveyors. To drive as little dip entry as possible, instead of driving panel entries, the room entries are continued to the boundary, a distance of about 3,000 feet. The seam of coal is overlaid with 300 feet of cover which is mostly sandstone and hard shale. This makes it possible to drive 30-ft. rooms 350 feet long, leaving 15-ft. pillars, advancing the entire 3,000 feet. The room and pillar system is used because several attempts at long face mining were unsuccessful through failure to obtain a clear cut break at the right place (see Fig. 1).

As the territory selected for the use of duckbill shaking conveyors was undeveloped at the time of installation, and as it was soon found that the entries could not be advanced rapidly enough by hand loading, three units were placed in the triple entries which were being driven to the boundary. These units advanced the entries at the rate of 25 feet per day (2 shifts).

Since the rooms are driven only from one side of the entries because of the grade, the driving of entries rapidly enough to maintain sufficient territory is an important factor.

Reasons for Not Grouping Units After Entry Driving

Each unit consists of a shaking conveyor with duckbill, a shortwall machine, drill, blower, and hoist to handle the cars past the loading point. After the entries were driven to the boundary line, one unit was placed in the last room No. 66, the second unit was placed in No. 57, the third in No. 47 and so on, assigning 10 rooms to each unit (see Fig. 1.) This method was adopted instead of grouping the units and using a gathering conveyor to a common loading point into the cars for the following reasons:

(1) If the units were grouped together, all of them would not uncommonly be working at one time in bad top territory.

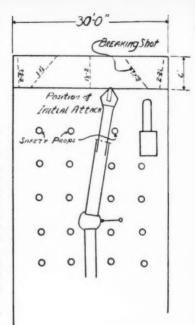


Fig. 2. Layout at face, with position of shot holes indicated

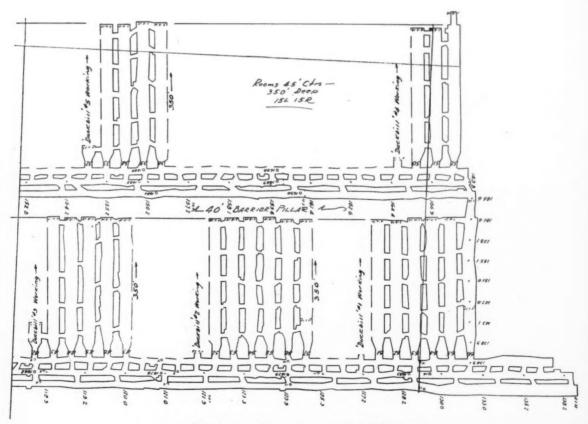


Fig. 1. Plan of workings, showing general method of development

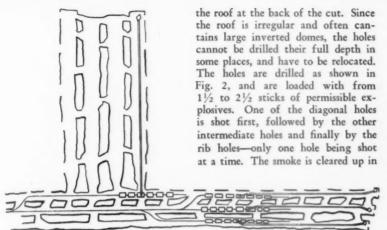


Fig. 3. Details of track layout for loading from room and entries

(2) By using a gathering conveyor there would be two more transfers of coal from one conveyor to another, which would result in more breakage—a prime consideration in the domestic markets where most of the coal is sold.

(3) If all units in one group advanced evenly they would all have to be moved at the same time, thus causing an excessive fluctuation of tonnage; if they didn't advance evenly there would be interference in moving one past the others on the entry while they were operating.

With the triple entry system the main track is in the middle entry with spurs through to the entry from which the rooms are driven. These spurs are located 10 rooms apart, so that each unit has a separate switch and can be served independently by the locomotive. Sufficient cars of 2½ tons capacity are usually spotted to hold the tonnage from one cut, amounting to about 30 tons. The coal is gathered to the main haulage where it is assembled in 22-car trips for haulage to the tipple.

Drilling and Shooting Practice

Faces are undercut 6 feet with a 6-in. kerf, and cuttings are cleaned out and loaded along with the other coal. The cutting machine is started as soon as sufficient face is available following the duckbill, and the drilling is carried along behind the cutting machine by the same men. The cutting and drilling keep two men busy while the other two men at the face are loading.

Five shot holes are usually drilled across the face starting 12 to 16 inches below the roof and slanted to a few minutes by the blowers placed at the mouth of each room with tubing to the face.

Details of Conveyor Operation

The duckbill makes its initial attack where the first diagonal hole, with a heavier charge, is shot. This enables the duckbill to advance to the back of the cut without encountering too much resistence. The coal is then loaded out on one side to the rib to make way for the cutting and drilling.

The breakthroughs are loaded out by hand onto the shaking conveyor.

Each unit works two 7-hour shifts, and the entire equipment comprising the unit is kept in the same room until driven out. The faces are advanced a maximum of three cuts per shift, with an average of $2\frac{1}{2}$ cuts including all

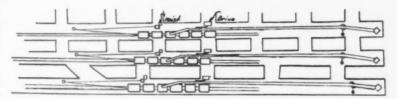


Fig. 4. Plan of duckbills loading in entries

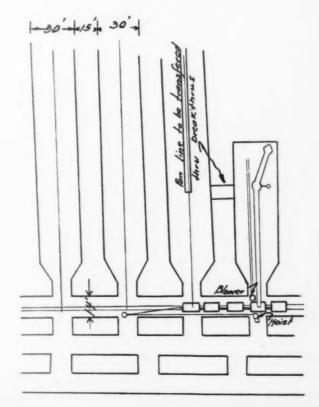


Fig. 5.
Plan of
duckbill
loading
in room

delays. Each crew consists of five men including the man for each unit at the loading point. The cars are either pulled up the slight grade in the entries or are lowered by gravity, whichever is the most positive at the particular location. It has been found that pulling them is usually more positive than lowering by gravity.

After a room is driven out the duckbill head and the drive unit are moved to the next room neck, but the pan line is left and moved through the breakthroughs as the new room is advanced. This system eliminates the work of moving the entire pan line down the old room and up the new. Until the rooms are driven far enough to accommodate the duckbill head—about 50 feet—the coal is loaded by hand onto the short pan line.

Operating Results Summarized

Following are monthly summaries of results of each loader unit, each unit being given separate numbers for day and night shifts. The first of the summaries is for loading in room, and the second for entries. Both include all delays and time in moving. The complete units including wiring for all motors are moved from one room to another in ½ shift or less, and the time in moving up in an entry, including track, is one shift.

The time in moving has been decreased by having the same man, who also handles maintenance, supervise the moving of all units.

Preparation Problems

Preparation after duckbill loading presents the same problems as after



Entry loading point

MONTHLY	RECORD	OF	DUCKBILLS	IN	ROOMS

			Tons Per	De	lays
Unit	Tons	Shifts	Unit-Shift	Hrs.	Min.
1	1.009.65	14	72.12	12	45
2	1,010.30	12.8	78.93	5	45
3	1,155.35	14	82.52	1	10
4	920.90	12.8	71.94	6	30
5	985.40	13.5	72.99	5	35
6	1,058.30	12.8	82.68	2	05
7	1,068.90	12.8	83.27	4	40
8	1,153.20	13.4	86.06	2	20
9	1,026.30	12.8	80.18	5	15
10	1,096.00	14	78.28	1	40
11	1,036.15	12.8	80.94	2	30
12	1,076.70	14	76.90	3	50
13	1,081.45	13.9	77.80	7	35
14	946.25	12.8	73.92	4	30
15	891.40	12.8	69.64	6	50
16	1,135.30	14	81.09	4	10
17	47.25	1.4	33.75	3	
18	1,012.35	13.7	73.88	7	15
19	973.05	12.8	76.02	3	20
Totals and averages	18,681.20	241.1	77.48	90	45



Duckbill loading bug-dust



Conveyor pan line in room

MONTHLY RECORD OF DUCKBILLS IN ENTRIES

			Tons Per	De	lays
Unit	Tons	Shifts	Unit-Shift	Hrs.	Min.
1	1,079.00	20.2	53.42	6	15
2	1,075.35	21	51.21	12	5
3	1,022.40	21.4	47.78	8	30
4	976.40	20.2	48.34	9	30
5	953.25	20.2	47.19	9	15
6	1,083.80	19.2	56.45	8	25
7	1,105.90	20.2	54.75	13	15
8	1,149.55	21.1	54.48	8	4.4
9	855.55	20.2	42.35	20	30
10	941.35	21.2	44.40	13	45
11	1,042.85	19.2	54.32	6	45
12	912.55	18.6	49.06	11	35
Totals and averages	12,197.95	242.7	50.26	128	

other methods of mechanical loading. As previously stated, the seam contains frequent streaks of impurities which are fairly uniform through the seam. These impurities, instead of being partly thrown back in loading, are loaded out and picked off the lump, egg and nut tables in the tipple.

The amount now being handled in the tipple is more than double that which was handled when coal was loaded by hand. The better portion of this refuse is being crushed and loaded in the company's own railroad cars for shipment to the different company power plants. Although the amount of fine coal has increased to some extent, this can be kept to a minimum by careful shooting.

As the time of operation has been little over a year, it is premature to comment on the maintenance and life of the equipment. During this time, however, a lot has been learned and improvements are being noted constantly. This is especially true in the personnel and organizational activities, which are under the direction of T. F. Christian, general superintendent, and W. A. Jones, mine superintendent.

MINE TUNNELS in the SOUTHERN ANTHRACITE FIELD

N 1936 it was my privilege to present a paper on the subject of "Tunnel Driving in Anthracite Mines" at the Coal Mining Convention of the American Mining Congress, which appeared subsequently in the 1936 Yearbook on Coal Mine Mechanization. The material for that paper was based on the driving of approximately 40,000 lineal feet of tunnel on a company crew basis, prior to which the tunnels of our company had been driven on a contract basis. In discussing the subject of tunnel driving with others interested in the same problem, it has become evident that the interesting part of our experience is not in the physical methods which we use, but rather in the performance factors that are obtained in the use of labor and supplies, and for that reason this paper will deal more with performance factors than with actual

In tunnel driving, as in any production work, a goal or "bogey" as

• An Analysis of Performance Factors

By B. L. LUBELSKY

Explosives Engineer
Philadelphia & Reading Coal & Iron Co.

it is more commonly called, is necessary as a working aim for the bosses to try to achieve. It is also necessary for us to know what we believe can be done in the way of performance on any job before we can intelligently decide whether we are getting a reasonable performance on that job. Instead of considering the standard for any one job, we will consider it for all the work which the company tunnel organization does. To understand that standard which we try to attain, and to understand the results which are obtained, some review of our conditions is necessary.

Separate Unit Maintained For All Rock Tunneling

The P. & R. C. & I. Company maintains its own company organization for the purpose of driving all rock work including rock gangways, tunnels and rock holes. This organization at present consists of one tunnel superintendent and 10 tunnel foremen. The superintendent, Nobel Smith, is in charge of the underground supervision of the tunnel foremen, who are, however, also under the direct charge of the colliery superintendent. A tunnel foreman may have as his territory one portion of a colliery or several col-

lieries depending upon the distribution of the jobs.

The annual work of this organization has consisted in the past three years of an average of 35,000 feet of rock development. The average cross section is roughly 95 square feet, giving a total annual excavation of approximately 3,300,000 cubic feet. Had this work been concentrated in several long jobs, the work would have been more efficient and performance figures would have been better. Actually, however, this work was divided between nine collieries, including an average of 42 working faces with a maximum of 65 working faces at any one time. The jobs vary in length from 120 to 3,000 feet, with many more short jobs than long ones. Usually the work is in solid rock, although many tunnels are driven through broken ground requiring timbering and in some cases forepoling. The rock varies from a soft sandstone through hard sandstone to hard conglomerate. The sandstone and the conglomerate are extremely abrasive, although not especially tough. A 31/2-in, piston drifter with 90 pounds of air will drill from 10 to 12 inches per minute in the sand rock, and from 6 to 7 inches per minute in the conglomerate. The 4-in. machines will drill from 10 to 12 inches per minute in the conglomerate.

Of the total cost of our tunnel work, the initial breakdown is roughly—labor 60 percent, supplies 29 percent, and overhead (including supervision, depreciation of equipment, maintenance and small supplies) 11 percent.

Labor, the Largest Cost Factor, A Fixed Charge

Labor, which is the largest factor in costs, is a fixed charge per shift of operation. Crews work seven hours, the size of the crew being fixed by agreement with the union. Overtime is frowned upon except in breakdowns, and the cycle of operations must be so planned that a drill crew can drill and blast in seven hours, and make sufficient but not more muck than the muck crew can handle and lay track and sheet iron in seven hours.

In determining the standard which we hope to obtain on any or all jobs, the most important consideration is the maximum advance per round that can be obtained within the limitation of labor. The footage that can be pulled would normally be determined by the economical breaking limits of the rock. However, due to the fixed labor schedule, this footage must be

limited to the ability of the muck crew to complete their cycle of operations in seven hours. Time studies over the past four years have given us rather accurate ideas as to the work that the muck crew can do, and on the basis of these time studies we have set up our standard performance.

This objective is based on the excavation of approximately 560 cubic feet of rock per round, which is roughly a seven-foot advance in an 8-ft. x 10-ft. tunnel. Irrespective of the dimensions of the tunnel, this represents a limit of the muck that can be handled, and as the cross sectional area increases, the advance per round decreases to maintain this total excavation factor.

Accurate Reporting System Main-

All jobs are checked for performance semi-monthly when the tunnel foremen's reports are due, and since these reports constitute the basis of our control, a brief description will be given of the office end of tunnel work.

Each tunnel foreman sends in a semi-monthly report of each of his jobs. This report is designed to give us information relating to about 95 percent of the total cost. It has the job description, kind of rock, number of cuts, feet advanced, labor detail, explosives, detonators, steel and small supplies used, the number of any drifter which was repaired and a list of the parts used. Any unusual factors

such as overtime, or an excess of supplies, are explained. These reports are entered on job sheets, which are kept separately for each job until completion, and when entered on the job sheet, units of performance and costs are calculated and become part of the job sheet.

These units, which are the index of performance for each job, are feet per cut, overtime in hours per cut, pounds of explosives per yard of advance, bits per foot of advance, steel consumption and detonators per cut. The performance factors are compared against preceding periods and the average to date, as well as against the average of all work. Any factors that appear to be out of line are taken off on another sheet, which in effect becomes the trouble sheet for the superintendent, who then becomes the important individual for either correcting or justifying the points called to his attention.

The detachable bits require an additional office control for greatest efficiency. A cumulative bit record is maintained for each colliery showing the bits used, the new bits furnished, reconditioned bits furnished, and the inventory adjustment of these items. As a check on shop efficiency, a cumulative record is also kept of the number of bits returned to the shops for reconditioning.

Drill maintenance, as reported for each drill, is entered on a drill card kept separately for each drill. Maintenance charges, however, are written in at the end of each month based on



Two faces of a 3,000-ft. tunnel met at this point

actual purchases, so that the inventory of parts is always written into the monthly cost. Small tools, as reported, are accumulated and added into cost at the end of each month, although a detail sheet is kept for these small parts.

Labor Performance

Table I shows the actual performance over three periods of operation. Period one is that which was covered in the previous paper, and is part of 1934 and 1935. Period two is 1936 and period three is 1937. For both period one and two, the eight-hour day was in effect and our labor limitations were not as strict as for 1937, when the seven-hour day became effective. In both 1935 and 1936 our actual performance per round was limited almost entirely by the physical limitations of the rock. The average fixed crew for 1935 was 6.9 men and for 1936 was 7.05 men. The advance per round was 7.06 and 6.84 feet, respectively. However, reducing this to advance per crew, this becomes 6.7 and 6.36 feet, respectively.

jective, which, under the conditions of work, would have given approximately 675 cubic feet per base crew for 1935 and 1936. The men during these periods were not actually working limit time on either the drilling or mucking shift, except on several jobs where special conditions resulted in overtime.

Overtime, as shown for 1937, has reduced the performance per base crew below the 560 cubic feet which we believe possible. Drilling overtime has all been caused by low air pressure. Mucking overtime is caused almost entirely by muck in addition to that which comes from the cut. Dressing down bad top and overbreak of the tunnel in softer ground add to the amount of muck to be handled.

Mucking Usually the Bottle-Neck

Mucking, which is in most cases the bottle-neck of the round, is not the most efficient operation, and is one of the places where the handicap of being a mine tunnel manifests itself. At the present time we are using some

rially and crowd the drill crew in its seven-hour shift if other delays and time losses are not kept to a minimum. In many of our jobs, as is common in mine work, the air pressure is so low as to slow down the drilling to the stalling point. Time studies of drilling operations have indicated that under normal air conditions, the major time consumed is in the operations associated with the drilling rather than in the actual penetration time of the drill. Most important single time loss is that of carrying the equipment to the face, setting up the columns and drills, and then later in tearing down and carrying the equipment back to the car. Depending upon the condition of the face, top and bottom, set-up time may run from 40 to 90 minutes, and a reasonable average for all jobs would be about 60 minutes. Since this is in a sense non-productive time, we have made efforts to reduce it to a minimum.

First, we reduced the weight of the column by using an aluminum alloy column so that one man could easily carry both column and arm. Later, we were instrumental in having designed an hydraulic column, also of aluminum alloy to replace the double screw jack. With the hydraulic columns, one solid block is used on the top of the column and is crushed into the roof no matter how irregular it may be. Set-up time with these columns is rather consistently about 12 minutes.

Another step in the same direction has been the development of a two-drill track-mounted carriage with the water tank becoming an integral part of the rig. The air and water connections between the drills and water tank are permanent, and to start drilling it is only necessary to connect a main hose from the end of the rig to the air line. This rig which has been operating for over a year has proven a useful time saver.

TABLE I LABOR PERFORMANCE FACTORS

	1935	1936	1937
Number of cuts	5,620	5,802	4.672
Ft. advanced	39,600	39,476	28,950
Average cross-section—sq. ft	90	92.4	90.2
Cubic ft. per cut	635	630	558
Advance per cut in ft	7.06	6.8	6.2
Average fixed crew-man shifts per cut	6.9	7.0	6.86
Overtime man shifts per cut	0.5	0.5	0.24
Total man shifts per cut	7.4	7.5	7.10
Cubic ft. per fixed crew	592	590	540
Advance per fixed crew	6.7	6.35	6.0

In 1937 we changed to the sevenhour day, and because of this our standard was based on cubical quantity moved. For purposes of comparison the number of cubic feet per round amounted to 635 in 1935, to 630 in 1936, and 558 in 1937. Reduced again to terms of fixed crews, these figures become 591 cubic feet in 1935, 590 in 1936, and 540 in 1937.

It is e excially interesting that the seven-h or day has not resulted in a proport onate loss as compared to the eight four day. Two things account for this: First, the work in the past two years has become somewhat more efficient; and second, and more important perhaps, the limited factor has changed. The limit under the eight-hour day was, as mentioned before, the economical breaking characteristics of the rock, and should have approached a 7.5 ft. advance as ob-

air driven pit car loader units of the belt type on the longer life jobs, and hand mucking on the majority of the jobs. The present mechanical mucking machines offer very little opportunity for us due to the large moving cost that must be borne by short jobs. The possibility of building a small self-contained mucking unit that will be no more difficult to move than a loaded mine car has been discussed with manufacturers, and there now appears to be a prospect of later having such a machine available.

Light Aluminum Column Reduces Drill Set-up Time

Drilling, while not the major problem in our labor cycle, is important in a good many of our jobs if we are to maintain the desired advance per cut. In the extremely hard rock, drilling speed may be reduced mate-

Automatic Feed Drifters Effective

The automatic feed drifters have also been finding a useful place. Seven have now been in operation for a period of over a year. While time studies showed that the actual drilling speed is not increased over the handfed drifters, a complete cycle study shows that the automatic feed drill will finish the cycle faster than the hand-fed machines. The explanation appears to be that the man operating the hand-fed drifter loses more time between holes, probably in an effort to rest his hands and wrists. The maintenance cost of the automatics

for the first year of operation compared favorably with that of handfed machines for the same period.

Water for the drills, which are all of the wet type, is furnished by water tanks on most jobs. Wherever possible we are now piping water to the face, since this saves some time losses.

Supply Performance

Detachable bits are used on all tunnel jobs with $1\frac{1}{4}$ -in. hollow round drill steel. New bits are bought in the $2\frac{3}{8}$ -in. size and are reconditioned by cold milling and re-heat treating. Reconditioned bits are recovered to the nearest $\frac{1}{8}$ -in. gauge. One group of collieries use the $2\frac{3}{8}$, $2\frac{1}{8}$ and $1\frac{7}{8}$ -in. bits, and another group uses the $2\frac{1}{4}$, 2 and $1\frac{3}{4}$ -in. bits. Theoretically we should not buy but the $2\frac{3}{8}$ -in. size, but actually make-up bits are required in the other sizes.

Drill steel is furnished in three lengths, 3 ft. 6 in., 6 ft. and 8 ft. 6 in. under the lugs. After steel has been broken we allow a 6-in. tolerance under the correct length, after which the steel is cut back to the next size. This means a considerable steel loss, but is more efficient than allowing odd length steel to accumulate on the jobs, since the men tend to set aside the odd length steel and accumulate an inventory of useless lengths.

Steel breakage occurs commonly at the shanks, and wear occurs at the thread end. We are regularly assured that shank breakage should not occur if the shank is properly forged; however, we have been unable to eliminate or reduce it in the past three years.

Re-Heat Treatment Has Raised Bit Performance

Table II gives the continued story of bit performance, repeating our experience of 1935 as previously reported in the 1936 Yearbook on Coal Mine Mechanization. The important comparisons may be briefed as follows: Footage per bit has been increasing, probably due to better reconditioning. The 1935 experience included some reground and not heat-treated bits, and the beginning of the re-heat treatment of bits. The performance in re-heat treatment has been improved considerably in the past two years. The ratio of reconditioned bits to new bits has been increased from 1.86 bit uses per new bit for 1935 to 4.26 for 1937, during which year we started the present system of buying a 23/8-in. bit, and using two groups of sizes. Prior to that we bought 21/4-in. bits, and all bits were recovered to 2 and

Arrangement of 19-hole round for blasting an 8-ft. cut in rock gangway. The six cut holes marked "0" are first fired together, followed by the other 13 in the order shown by the figures

13/4-in. This should have given us three bit uses per new bit and for 1935 and 1936 our actual was 2.0 bit uses per bit or an efficiency of 66 percent. For 1937 our theoretical should have been 6 bit uses per new bit and actual was 4.26, or an efficiency of 71 percent. Both shank breakage and thread wear have been increased materially in 1937. Part of this was caused by converting steel from one type of thread to another which was not separated from actual wear. However, there was a definite increase in both shank and thread replacement, the cause for which has not yet been determined. Steel replacement for 1936 included considerable increase in inventory at the face, which was reduced during 1937 so that a total for 1936 and 1937 of 6.1

feet per 100 bit uses can be taken as normal replacement.

General opinion, as expressed by bit and steel salesmen, is that steel replacement should all be made in the long lengths of steel. However, our experience has been that breakage occurs much more frequently in the starter steel and that in addition to the starters that are cut down from the longer lengths, it is necessary to add new starters. The actual steel replacement and breakage by sizes was as follows:

		Pur- chased	Break- age
8	ft. 6 in. (third steels).	.32%	16%
	ft. (second steels)	37%	34%
	ft. 1 in. (starter steel)	31%	50%

TABLE II DETACHABLE BITS AND STEEL PERFORMANCE

	1935	1936	1937
Ft. of hole drilled (est.)	936,000	940,000	690,000
	108,000	79,226	26,638
Reconditioned bits	93,155	92,753	86,801
Ft. drilled per bit	4.65	5.46	6.07
Shank repairs	1.675	1,593	1,671
Thread repairs	1,687	2,098	2,553
Ft. of hole per shank repair	560	590	415
Ft. of hole per thread repair	555	448	262
New steel furnished—			
Pieces	1,420	2,320	296
Ft	9,440	15,417	2,048
Bit uses per new bit purchased	1.86	2.17	4.26
Ft. of new steel per 100 bit uses	4.7	8.95	1.8
Ft. of hole per round	162	162	143

In order to reduce our steel losses due to cutting, we have for some time been experimenting with the use of a detachable shank which has now passed the development stage and is being introduced on some of our jobs. This shank has a life of approximately 12 times the conventional shank, which results in steel shrinkage being limited to thread replacements.

Hole Centralizers Reduce Breakage of Starter Steel

To reduce actual breakage in the starter steel, most of which we believe comes in the collaring of the hole and the strain of misalignment caused by bad collaring practices, we are now equipping our drills with hole centralizers or hole spotters, which eliminate the practice of the drill helper holding the steel at the face with a wrench. This has also a desirable safety factor, since injury to the helper is not uncommon.

Dynamite and detonators constitute the largest supply cost and are, of course, dependent upon the efficiency of the drilling and the blasting. As described in the previous paper, a drill round consists of from 19 to 24 holes, depending upon the hardness of the rock. All rounds consist of a six-hole wedge cut which is fired separately before the remainder of the round is loaded, except under unusual conditions where time limitations require the charging and blasting of all holes simultaneously. A typical round consisting of 19 holes, and expanded to meet harder conditions, is shown in the sketch. In all rock work the explosive used is 60 percent Ammonia Gelatin, or a Semi-Gelatin in 11/2 x 8 in. cartridges. Electric blasting caps

TABLE III
LABOR AND SUPPLY PERFORMANCE UNITS

	1935	1936	1937
Fixed man shifts per round—			
Drill	3.4	3.4	3.4
Muck	3.5	3.6	3.46
Total	6.9	7.0	6.86
Overtime-man shifts per round-			
Drill	0.3	0.4	0.1
Muck	0.2	0.1	0.14
Total	0.5	0.5	0.24
Ft. drilled per round	162	162	143
Advance in ft. per round	7.06	6.84	6.2
Cubic ft. per round	635	630	558
Cubic ft. per fixed crew	592	590	540
Lbs. of dynamite per round	116	96	80.5
Lbs. of dynamite per cu. yd	6.75	5.65	5.52
New	19.2	13.7	5.6
Reconditioned	16.6	16.1	18.6
Total	35.8	29.8	24.2
New steel per round—			
Pieces	0.25	0.40	0.063
Ft	1.67	2.65	0.44
Detonators per round	22.6	21	19.7
Thread repairs per round	0.3	0.36	0.54
Shank repairs per round	0.3	0.27	0.36
Small supplies per round	\$0.54	\$0.57	\$0.58
Drill maintenance per round	\$0.91	\$0.94	\$0.72

and all-metal delay electric blasting caps are used, and are fired from a 50-shot blasting machine.

Summary

Table III shows in detail the important factors which go to make up the tunnel cost, and is self-explanatory. Small supplies consist of such items as picks, shovels, handles, wrenches, pipe fittings, oil and grease, connecting wire and every other item that is not separately covered in its own classification. Drill maintenance, as mentioned

previously, includes not only those parts which were replaced during the month, but also all parts in our inventory.

During the past year we have operated 76 drifters, or 38 sets of tunnel equipment which have given us an average of slightly over 12 rounds per month. All tunnel equipment is charged off in three calendar years irrespective of working time, and of the equipment now on hand practically 80 percent has been depreciated completely.

International Management Congress

The Seventh International Management Congress will open its five-day series of general and technical sessions in Washington, D. C., on September 19, continuing through September 23. The comprehensive program of activities will develop the two official themes of the Congress—"Recent Developments in Management" and "Economic and Social Aspects of Management."

In this triennial meeting of world experts in the field of management, leaders of the Congress believe that there is afforded the finest opportunity

in a decade for consideration of those fundamental problems which should be the main concern of management its opportunities, responsibilities, relationships, techniques, and practices.

Membership in the Management Congress is open to anyone interested in the problems of management upon the payment of a registration fee of \$10.

Iron and Steel Survey

The United States Tariff Commission recently issued a 527-page survey on iron and steel covering the industries and international trade of the

principal producing and trading countries, with particular reference to factors essential to consideration of the tariff. This survey has been in preparation for about two years. It embodies comprehensive and up-to-date information respecting the iron and steel industries of the world. Its issuance at this time is opportune because of recent important changes in the industry and international trade in many parts of the world.

A limited number of copies of the report (No. 128, Second Series) are available for distribution by the Tariff Commission, or the report may be obtained from the Superintendent of Documents, Washington, D. C., at 60 cents per copy.

Increased Extraction and Decreased Cost of Ore Preparation

WASTE material forming the dumps from earlier periods of ore mining and milling operations is now quite generally being retreated at a profit for the recovery of remaining mineral values, indicating the great progress made in the development of more efficient equipment and methods.

During the excitement and stress of pioneer mining days primitive devices and tools were employed for the recovery of minerals, with the result that one-half or more of the values escaped with the tailing down the stream. To obtain the cream of the values in the least possible time, rockers, long toms and riffled sluices were used with large volumes of water resulting in the recovery of the coarser particles of mineral, while the extremely fine particles were washed away to form deposits of commercial value to leasers and prospectors of the present period.

The working of creeks and streams for the recovery of gold led to the discovery of mineral veins. Then came the period of the stamp mill for the crushing of the ore, followed by development of copper plates coated with quicksilver for the amalgamation of the gold values. This combination of stamp mill and amalgamation plates recovered about 50 percent of the gold in the ores. Additional equipment such as bumping tables, vanners, and riffled tables of the reciprocating type increased the recovery about 20-25 percent.

In the treatment of ores containing large crystals or aggregates of valuable minerals, jigs were introduced for the concentration of the coarser sizes, while reciprocating riffled tables or vanners were used to concentrate the finer pulp sizes. This type of mill required a variety of equipment in the form of ore feeders, crushing rolls, belt and bucket elevators, revolving sizing screens, hydraulic classifiers, pulp distributers, launders, shafting, pulleys and belting—all the machinery units being driven from a central power plant. The ore treatment plant of

• Stamps Generally Replaced by Ball Mills for Fine Grinding in More Efficient Cyanidation and Flotation Processes. Jigs Finding Renewed Favor

By FRANK E. SHEPARD

Mechanical Engineer, Denver Equipment Co.

that period thus became a complicated system to operate and maintain.

The stamp mill performed most creditably as a crushing unit. Through the cooperation of manufacturers and operators many improvements were made to increase the capacity from 1 ton to 8 or 10 tons of ore crushed per stamp in 24 hours. Wearing parts of hard cast iron used in the earlier period were replaced later with chrome and other alloy steels, thus increasing the life of the stamp parts and reducing costs of renewals of the parts per ton of ore crushed.

Ball Mill Developed for Fine Grinding in Cyanidation and Flotation

With the introduction of cyanide and flotation processes for increased recovery of mineral values, the stamp mill was used effectively as the crushing unit for a number of years, and still finds favor in a number of large operations in the United States, South Africa, Australia and other mining districts of the world. Cyanide and flotation processes require fine crushing to liberate the mineral values from the accompanying rock material. When it was found that in factors of weight, price, floor space and power required, the cost of installing a ball mill as a crushing unit was about onethird the cost of a stamp mill of equal capacity, the ball mill was adopted as the standard crushing unit for in-creased efficiency and reduction of costs in crushing operations.

In the earlier periods of ore treat-

ment the stamp mill was the favorite fine crushing unit for plants of smaller capacity treating from 10 to 20 tons per day up to 50 or 60 tons per day. The weights of each stamp in these earlier batteries varied from 550 to 850 pounds, but these weights were later increased up to 2,000 or 2,250 pounds per stamp so that a 100-stamp battery was capable of crushing from 500 to 600 tons per day.

Maintenance Costs Also Generally Favorable to Ball Mill

The maintenance of these stamp mills was a great task requiring renewals of cams, tappets, stems, shoes and dies, as well as other numerous mechanical parts, and operators were constantly seeking simpler and more efficient methods of crushing ore led to the introduction of the ball mill as the fine crushing unit.

The prevailing practice in these stamp mills was to follow the stamp batteries with copper plates coated with quicksilver, and later to silver plate the upper surface of the copper plates with two or three ounces of silver per square foot of copper plate surface. The quicksilver was then applied on the silver plated surface.

These plates required constant attention and care, and it was during this period that master workmen were developed, known as amalgamators, who attained great skill in recovering the highest possible percentage of gold values. Grateful appreciation is due these workers who carried ore milling practice to higher standards.

Cyanidation and Flotation Great

Cyanide and flotation processes advanced the recovery of mineral values to higher points of efficiency and new relations of chemistry and physics were established. For generations efforts were directed to the differential sinking of the heavier mineral particles, but now we are dissolving and floating them.

On the occasion of the installation of the first flotation mill in the western mining districts of the United States, W. R. Ingalls, eminent author and statistician, published in the Engineering and Mining Journal an article entitled "Concentration Upside-Down."

It is interesting to note the selective action of the modern flotation machine with its rotating impellers introducing air in the form of minute bubbles into the mass of finely ground ore pulp, with addition of acids, oils and a variety of reagents to produce a film on the outside surfaces of the minute air bubbles.

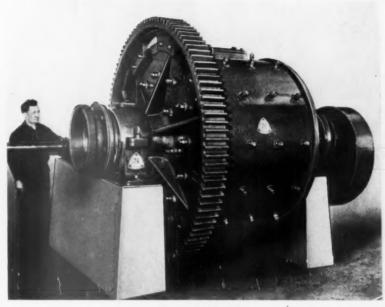
This results in sulphide particles of the metals attaching themselves to the film on the outside surfaces of the bubbles, and being carried upward to the surface, forming a froth which contains the mineral values. This is then discharged from the flotation cell by mechanical means. The quartz or other gangue associated with the minerals does not adhere to the film on the outside of the air bubbles, but falls to the bottom of the flotation cell whence it is discharged from the machine as tailing.

Extremely Fine Crushing Necessary

Both the cyanide and flotation processes require extremely fine crushing in order to liberate the mineral particles from the gangue. Cyanide treatment of the ores sometimes requires crushing the ores into particles which will pass through screens as fine as 100 or 200 mesh to the lineal inch; while for flotation treatment the ores need to be crushed to a fineness of about 50 to 80 mesh.

This requirement for fine crushing increased the demand for a fine crushing unit which would be simpler in construction, fewer parts to adjust and maintain, and constant and regular in operation, as compared with the complicated construction of the stamp mill. The ball mill thus became the standard fine crushing unit for this section of the mill system.

Ball mills are horizontal cylinders



A 5-ft. x 5-ft. ball mill

constructed with diameters from 3 ft. to 8 ft., special sizes being made of larger diameters. The length of the ball mill cylinder is usually about 1 to 1½ times the diameter. Ball mill cylinders are supported by heavy hollow trunnions with extra heavy bearings. The mill cylinder contains a charge of cast iron or forged steel balls from 2 to 5 inches in diameter, which act as the grinding medium on rotation of the ball mill cylinder. The finely ground ore is discharged from the inside of the mill cylinder through the central hollow trunnion at the discharge end of the mill, or through gratings with lifting devices to raise the pulp from the bottom of the mill cylinder to the level of the central hollow trunnion.

When ball mills were first used ore was fed to the mills as large as 2½ inches in diameter, but in later types of ore treatment plants secondary crushers have been introduced which reduce the ore fed to the ball mills into particles from 3/8 to 3/4-inch in diameter.

This results in a greatly increased capacity of the ball mills and a reduction in the wear of the balls and the liner plates of the mill. Both heads and the shell of the ball mill are generally lined with heavy plates of cast chrome, manganese or molybdenum steel alloys, which have greatly reduced the wear of these parts as compared with former liner plates of hard cast iron.

The finely ground pulp discharging

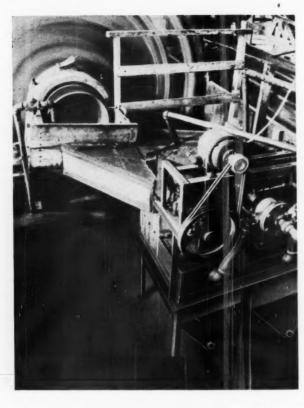
from the ball mill flows to classifiers of reciprocating or rotating types which divides the pulp into coarse and fine sizes, the coarse particles being elevated to the feed end of the ball mill for regrinding, while the fine pulp overflows from the classifier to the cyanide or flotation sections of the plant for further treatment.

Jigs Find Important Place in Flow Sheet

Another important device introduced for increased recovery of mineral values is the jig, one type being shown in the cut on page 32. The jig is placed in the mill circuit between the ball mill discharge and the classifier, in which position it commonly recovers from 50 to 75 percent or more of the free gold or mineral values. This reduces grinding costs because many of the free mineral particles are removed immediately from the mill circuit. The percentage of recovery in later stages of the mill circuit is also improved.

A remarkable result accomplished by the jig illustrated is the extreme fineness of the mineral particles recovered. A recent microscopic examination showed that gold particles as fine as 12/1000 of a millimeter (equivalent to 1/2150 of an inch) were recovered in the hutches.

Jigs are also finding favor as concentrating units for the recovery of gold and black sand values contained in the gravel or sand of placer deposits.



Jigs are finding renewed favor in concentrating practices. Shown at left is a jig used between ball mill and classifier

They may be used in connection with hydraulic sluicing operations, with stationary or portable washing and screening plants operating on dry land, or mounted on the decks of gold dredges to treat directly the gravel screened through the openings of the large revolving screens of the dredges.

Fine Gold Lost by Sluices

In hydraulic sluice operations the riffled sluices require about 30 cubic feet of water for each cubic foot of gravel or sand treated. Gold dredges use about 40 or more cubic feet of water for each cubic foot of gravel treated. This large volume of water sweeps away the extremely fine gold particles with the tailing discharged from the sluices, amounting to a considerable loss of the gold values.

The type of jig illustrated requires only about 5 or 6 cubic feet of water for each cubic foot of gravel or sand treated. This reduction in the amount of water required amounts to a considerable saving in power as well as an increased recovery of the extremely fine gold particles.

Dredge operators are now recognizing the importance of jigs in the efficient recovery of gold values, as large installations in United States, Alaska and other gold placer districts of the world are now using them in their operations.

One of the first jigs used in gold dredge operations was the Neill jig of the fixed screen type, with swinging vertical paddle to produce the water currents, and this type operated suc-

cessfully in a number of dredge operations. Taggart's *Handbook of Ore Dressing* reports the results of Neill jig tests on tin gravel showing 86 to 89.5 percent recovery of values.

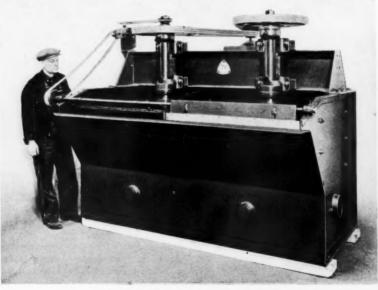
Dr. Robert H. Richards, inventor of the Richards pulsator jig used upward pulsating water currents to effect the separation of mineral values from associated gangue material, which principle was successfully used in the classification of ore pulps previous to gravity concentration. Dr. Richards was an early advocate of the use of jigs on gold dredges for the recovery of gold values.

This principle of upward pulsating water currents in jig operations greatly increases the capacity per square foot of jig screen area and produces a clean, high grade concentrate. It is remarkably effective in the recovery of gold and black sand values from placer gravel or sand.

This same principle of upward pulsating water currents is utilized by the mineral jig, and a rotating water valve greatly reduces the amount of water required in its operation.

Recoveries in Modern Plants High

Important improvements in the machinery and equipment of modern ore treatment plants have been most effective in the increased extraction of mineral values from ores. Comparing the 50 percent extraction of pioneer methods we may now be assured of 95, 96 or even 97 percent recovery in the ore milling plants of today.



A twin flotation unit of all steel construction

The introduction of secondary ore crushers to increase the capacity of ball mills; the use of ball mills for the fine crushing units instead of the stamp battery; the introduction of jigs in the ball mill-classifier circuit; improvements in flotation machines, pulp thickeners and agitators—all these have contributed, step by step, to increased recoveries.

Individual Electric Motor Drives Aid Efficiency

A notable improvement is in use of individual electric motor drives, allowing the machinery units to be arranged in the mill plan for more accurate control of speeds, saving labor and time, and removing the various details of shafting, bearings, pulleys and belting with their concomitant care and maintenance.

Belt conveyors have replaced belt and bucket elevators; and centrifugal sand pumps are used to elevate pulps to any required level—both allowing the equipment to be placed in the most efficient relation to other units of the plant.

In large mill installations concrete and steel are used for greater stability of foundations, considerable saving of space compared with former timber construction, and greater security from the fire hazard with attendant reduction of insurance rates.

All these improvements have been made possible through the collaboration of a host of investigators who have devoted their skill and talents to the development and solution of chemical, metallurgical and mechanical problems for continued improvement in the extraction of mineral values from the ores, involving the use of

higher grade materials and more accurate construction of machinery and equipment for the treatment of the ores.

Costs of Machinery and Equipment

(Data from Denver equipment index)

The costs of machinery and equipment for mills of small capacity are indicated in the following approximate prices:

Amalgan	natio			gravit	у							FOB factory
5-10	tons	per	24	hours								\$1,500
11-15		7.5	25	27								0.000
16-20	22	22	2.2	22								0.700
25-35	37	2.9	97	59								0.000
50-65	22	22	**		0							0.000
90-09					*	×	*	*	*	*	*	6,000
Flotatio	n mi	lls										
16-20	tons	Der	24	hours	t							\$5,500
25-35		22	22	27								F =00
50-65		22	22	22								44 000
100-12		22	22	22	*							48 800
100-126	,				×	*	*	*		*	*	17,500
Cyanide	mill	g										
16-20	tons	per	24	hours	×	1	0		N	Di	1	\$15,000
25-35	97	97	39	33								20,000
60-75	23	99	99	37								25,000
100-12		99	37	99								45,000

Total Cost of Flotation Mills, Erected and Ready to Run

The following estimates are for flotation mills, erected and ready to run. They include building of roads to mill site, excavation, concrete work, mill building and materials, machinery and equipment, labor of erection, pipe and fittings, electrical wiring, engineering and general expense:

50	tons	per	24	hours.				\$15,760
				hours.				207.335

Total Milling Costs

The following milling costs in several flotation plants are given by J. M. Callow in Taggart's Ore Dressing:

	Cost
Plant	per ton
Utah Copper Co	. \$0.61
Inspiration	. 0.53
Nevada Con. Copper Co	
Miami	. 0.64
Porphyry Copper	. 0.60
Utah Con. Copper Co	. 1.10
Magma Copper Co	. 1.04
Bluestone	. 1.23
Utah Apex	. 1.36
Silver Dyke	. 1,36
Eustis Copper Co	. 1.54

Comparison of Costs-Old and New

The following comparison shows the reduction in milling costs in changing an old mill, with old equipment and methods, to a new mill equipped with latest improved machinery and equipment, using the flotation process:

Old mill treating tons per 24 hrs New mill treating	 \$1.04	cost	per	ton
tons per 24 hour	0.76	29	22	2*

Reduction indicated. \$0.28 per ton

This comparison shows the results accomplished by mill equipment and methods of a former period, changing to new equipment and improved methods, treating the same ore in the same mill with a reduction in milling costs of about 27 percent.

Appreciation and great credit is due research laboratories, geologists, metallurgists, manufacturers, mill managers, foremen, and workmen on the shift, in their search for better methods, knowledge of ore deposits, chemical and physical reactions in ore treatment, greater accuracy in manufactured machinery and equipment, more efficient management and records, faithful attention to plant operations. Yet with all this advance to higher levels of efficiency, "we hope for better things."

Safety Meet at Ward

With some 2,000 miners and other interested persons in attendance, the third annual safety day was held at Ward, W. Va., on Kelleys Creek, July 30.

Highlight of the day was a brief address by Governor Holt, of West Virginia, who lauded the excellent work being done by mine safety teams, and commented on the excellent progress being made in mine safety work throughout the State.

The safety day and program was sponsored by the Kelleys Creek Colliery Company and Local No. 340 of the United Mine Workers. The safety team from the No. 4 mine, captained by Frank Settles, was declared the winner, with second place honors going to the team of the Riverview Coal Mining Company from Coalburg.

An elaborate program included an address of welcome by Carel Robinson, manager of mines of the Kelleys Creek Company; and talks by N. P. Rhinehart, chief of the State Department of Mines; A. G. Matthews, State Compensation Commissioner; and William Blizzard, of the United Mine Workers.

Arizona Copper Companies Restore Wage Cuts

Inspiration Consolidated Copper Company, Miami Copper Company, Phelps Dodge Corporation, Magma Copper Company, and other prominent operators have restored the 10 percent cut in wages that went into effect July 1. This cut had reduced the pay of the miners to \$5 per day, and the present increase, effective August 4, restored the pay level to \$5.48 a day. With smelter and mill men also receiving the increase, more than \$,000 employes will be benefited.

TRUCK HAULAGE and BITUMINOUS COAL-STRIP MINING

THE advance made in strip mining of bituminous coal from the early days to the present is well known. Today the production of bituminous coal by stripping exceeds that of underground mines in some States, while in others the production of coal from strip mines has shown a marked increase.1

The rapid growth of the stripping industry has been due largely to the perseverance and foresight of the operators and the ability of the manufacturer to meet the demands of the operators for equipment capable of mining coal beds with increasing thicknesses of overburden. Large electrically operated stripping shovels with dipper capacities of 33 cu. yd. have been successfully developed, and larger machines are being considered. Electrically operated coal-loading shovels equipped with 7-cu. yd. dippers are being used. In most mines these have resulted in an increase in daily production and the need for a flexible system of transporting the coal from the face to the preparation

Until a few years ago rail haulage was used exclusively for transporting coal from the mine to the tipple. However, with the improvements in design of motor trucks and trailers, motorized haulage has been successfully introduced into strip mines.

The coal mining section of the Mining Division, Bureau of Mines, has made an extensive survey of rail and motorized haulage in strip mines, and a detailed discussion of this subject will be published by the Bureau in the near future. The present article will give only generalized features of motorized transportation in strip

Large bituminous coal-strip mines using motorized haulage are situated

• Assures Flexibility of Operation and Mining in Isolated Areas. Larger Haulage Units Require More Attention to Roads

By ALBERT L. TOENGES

Supervising Engineer Coal Mining Section, Mining Division Bureau of Mines, Pittsburgh, Pa.

in Ohio, Indiana, Illinois, Kentucky, Missouri, Kansas and Oklahoma. The production of individual mines ranges from 1,000 to 4,600 tons per day from coal beds 18 to 90 inches thick. The topography of the mining areas varies from rolling prairies in the Southwest to rough surfaces in northcentral Missouri and parts of Illinois, Indiana, and Ohio.

Character of Coal Beds

The surface of the coal beds is level in some areas and irregular in others. Local dips as great as 14 percent are encountered in some places. The coal in the upper section of some beds is brittle, and the operation of haulage units on coals of this character causes rapid disintegration of the coal surface. The holes that develop owing

to this disintegration in turn cause haulage difficulties. Some beds contain clay veins or horsebacks composed of shale and clay, and when the shale and clay become water-soaked from ground water, rain, or snow, a haulage problem arises. These factors are usually taken into consideration in planning the haulage system.

Location of Haulage Roads

At the mines with which the writer is familiar the length of the roundtrip haul ranges from 1 to 8 miles, and the roads are located as follows with respect to the coal area:

1. The main road may be located outside the limit of the coal area or outcrop of the bed and lateral roads



Length of round trip haul from pit to preparation plant ranges from 1 up to 8 miles

[†]Published by permission of the Director, Bureau of Mines, United States Department of the Interior. (Not subject to copyright.) ¹Toenges, Albert L., and Anderson, Robert L., Some Aspects of Strip Mining of Bitu-minous Coal in Central and South Central States: Bureau of Mines Information Circular 6959, October 1987, p. 7.



Large truck-trailer units such as this have afforded marked economies in strip operations

constructed into the mine at various intervals, 600 to 1,000 ft. apart. When the main road is situated outside the outcrop, the stripping shovel must leave openings in the spoil pile for lateral roads into the mine. This presents no problem in the early period of the operation, but when the thickness of the overburden increases to 45 or more ft. the opening that should be left for the lateral is badly needed for disposition of the spoil. As the thickness of the overburden becomes greater, it may be necessary to use the space usually left open for the lateral.

2. After the coal area has been located by drilling and the maximum mining limits have been determined, the main road may be located beyond these limits and laterals constructed into the mine. As the mine is worked toward the main road, the grades on the laterals become greater, and care must be exercised in locating the main road, so that the last cut will not be too close to it, thus increasing the grade above the maximum allowed.

3. At some mines the road is built outside the mining limits to the end of the property, and a lateral is built into the mine at each end, the trucks or truck-trailer units (hereafter termed simply "units") traveling the length of the mine on the coal in one direction only.

4. In some localities the coal bed outcrops on the sides of valleys, and it is possible to construct the dumping station at the preparation plant below the bed. The major part of the road is then on the coal, and the advance of the mine is usually planned with respect to this main road.

Construction of Roads

After an area has been mined it is abandoned. Hence means of ingress and egress to the property cannot be constructed for permanency, and the cost of a road must be returned during its life. There was no precedent for the construction of temporary roads over which exceptionally heavy loads could be hauled, hence operators have experimented with various types of road construction. For economical transportation the road should be well drained and grades kept to a minimum.

After grading, the sub-base usually consists of tipple refuse, the thickness of which varies with conditions and ordinarily ranges from 12 to 18 in. This is rolled and leveled. The width of the surfacing of main roads ranges from 25 to 40 ft. At some mines the top of this sub-base is the wearing surface, whereas at others a top dressing is used which consists of several layers of burnt mine shale, gravel, or crushed rock. Sometimes this top dressing is treated with road oil or calcium chloride. At several properties where oil treatment is used, the oil is applied before freezing weather sets in and when the nights are cool enough so that the oil will set properly. As the surface of the road is worn down by the haulage units, it is not scorified, but another layer of crushed rock is added and treated with oil. The surface of the road is not disturbed. This method of maintenance has proven very satisfactory.

Haulage Systems

Where the main haulage road is situated outside the coal area and laterals are built into the mine, the units enter the mine over a lateral, travel to the loading shovel on the coal berm which ranges in width from 15 to 30 ft., and after being loaded travel on the coal to the nearest lateral and leave the mine. This is a modified circle haul.

Where the entrance to the mine is at the end of the cut, the empty units usually enter at the far end, travel on the coal to the loading shovel, then leave the mine at the lateral nearest the tipple. This is a true circle haul. Where a circle haul or modified circle haul is not used the units usually pass one another on the coal berm in the mine, or empties travel on the bottom if it is hard. The trucks turn at the loading shovel either before or after being loaded.

Loading

The swing of the loading-shovel dipper is usually over the unit and toward the cab, not over the cab; this is a safety measure. The time at the loading shovel depends upon the size of the dipper, size of haulage units, width of cut, and amount of impurities in the bed. Usually there is little variation in the time required for loading units at the same mine. The ideal practice is to load continuously—that is, an empty unit should arrive as another is loaded.

Dumping

Dumping consumes a small part of the total time per trip, as the units usually pass over a hopper and dump either from the bottom, side, or end (depending upon the type of equipment) and stop for only a short time. Sometimes the rate of dumping is delayed owing to slowing up of the preparation-plant feed for reasons such as crushing or special sizing.

Running Time

The speed of the units is usually limited by a governor to a maximum of 20 to 30 miles per hour. The time spent in travel depends upon the maximum grade, condition of the roads, and length of haul.

Types of Equipment

The types of haulage equipment used in coal strip mines may be classified as follows:

- 1. Single-unit truck with side or end dump.
- 2. Tractor-trailer units. The trailers are either side or bottom dump.

The capacity of trucks in the first class ranges from 6 to 30 tons. The drive is to a single or double rear axle, ordinarily equipped with dual wheels.

Tractors of the second class have a single or double rear axle, usually equipped with dual wheels. The units are powered with Diesel or gasoline-operated motors. Tractors usually are designed for specific physical conditions that are expected in the mine where they are to be used.

A single tractor-trailer unit consists of a tractor and semi-trailer with the front end of the trailer mounted over the rear axle of the tractor. There may be one or two rear axles under the trailer, depending upon the loaded capacity, and each axle is ordinarily equipped with dual rear wheels. At some mines a full trailer is added



Largest unit developed—a 40-ton trailer being tried out by a strip operator

to the tractor-trailer unit, doubling the capacity of the unit. The capacity of trailers ranges from 10 to 25 tons. One operator is experimenting with 40-ton-capacity trailers. (See accompanying cut).

Tire sizes vary according to the load carried by the units. The life of tires depends upon many factors, including speed, load, grades, slippage, and condition of the roads. From the information gathered, their life ranges from 6,000 to 12,000 miles.

The gasoline consumption of haulage units varies greatly. Many factors affect the consumption, among which are condition of equipment, roads, grades, loads, speed, and length of haul. The following data are of interest:

Virtually all mines employ mechanics who inspect the haulage equipment daily and make the necessary repairs. Drivers are required to make a report each day on the condition of the equipment. At some mines the equipment is washed daily.

The cost of a haulage unit varies according to type and capacity, and ranges from \$6,600 to \$19,000.

Summary

One advantage of motorized haulage in strip mines is flexibility of operation. Little or no delay occurs when loading is from the end of a cut, as units can be manipulated easily at this point, and a more uniform daily production results than with other types of haulage.

Size of unit, tons	15	15	20	20	25	
Length of haul, miles	2.1	8.0	2.46	1.30	4.93	
Miles per gallon		2.37	1.92	1.11	1.68	
Kind of road	Crushed stone	Oiled	Crushed stone	Gravel	Shale	

EXAMPLES OF OPERATING PERFORMANCE

Average	daily production, clean coal, tons	2,100	4,600	
Thicknes	s of coal bed, inches	54	69	
Length o	of haul, round trip, miles	1.0	3.95	
Number	of haulage units	5	8	
	of haulage units, tons of raw coal		26	
Size of l	oading shovel dipper, cu. yd	5	5	
Average	time at loading point, minutes:			
Load	ling	1.83	1.97	
Dela	ys	1.40	2.26	
Tota	d	3.23	4.23	
Per	ent of total time	28.4	22.3	
Average	time at dumping station, minutes:			
Dun	pping	0.11	0.61	
	ys		0.61	
	il		1.22	
Per	ent of total time	. 26.3	6.4	
Average	running time, minutes	5.17	13.55	
Per	ent of total time	45.3	71.3	
Total el	apsed time, minutes	11.40	19.0	
Average	number of trips per hour per unit	5.26	3.16	
Average	tons per hour per unit	60.0	82.0	

Motorized haulage also makes possible the economical mining of isolated areas of coal by stripping methods that could not be mined otherwise owing to the large investment necesary for railroad construction. Arrangements can be made to use State or county roads with this type of haulage in some areas.

The trend is toward larger equipment not only for stripping and loading but also for haulage. Careful consideration should be given to the construction of roads for carrying large-capacity equipment. It is possible that the carrying efficiency of large units can be increased by the use of special steels. Undoubtedly the manufacturer will continue to meet the demands of the operator for larger and more efficient equipment.



Inflation is spreading to the far corners of the earth... African native miners are demanding wage increases... It seems that the price of wives has risen to \$25 each...

Hungary announces the establishment of a dozen labor camps... They ought to import some of our WPA'ers to teach the boys the proper way to lean on a shovel without breaking it.

Our grandchildren are going to have a lot of fun telling their grandchildren how we finally balanced the budget. . . .

What has a lot of people wondering is the application of the adjective "liberal" to the present Administration... Liberal nothing.... Bountiful, munificent, lavish, all would be more like it....

Nobody is kicking about the necessity for taxes. . . . But it looks like there is something wrong when a tax system is so complicated that the Government spends more time studying its inequities than in collecting the revenue. . . .

One thing about the present primary campaigns. . . . You haven't heard about a candidate who wears no man's collar. . . .

And speaking about Corrigan, some Senators who took off with the Democratic party in 1933 know exactly how that young aviator felt when he took off for California and landed in Ireland....

Times change.... Not so long ago we kept cool with Coolidge.... Now we keep warm listening to a fireside chat in mid-summer....

Out in Montana the miners still think President Roosevelt is a great man. . . . But they hope he won't mention copper again as long as he is in office. . . .

Maybe there is something to this prosperity rumor after all. . . . An Indiana railroad has asked the ICC for permission to lay additional track instead of the usual request for pulling up existing lines. . . .

You'll note that the Congressmen headed for home before the increased railroad fares went into effect. . . . Allowed 20 cents a mile, you'd think the legislators would be glad to help out an ailing industry. . . .

Congress keeps interesting itself in stream pollution. . . . There are other pollution problems it ought to look into. . . .

Postmaster General Farley reports a gratifying increase in postal business. . . . Mr. Farley undoubtedly overlooks the flood of letters to Washington asking for help and the replies from Washington promising that help is on the way. . . .

An astronomer tells us that if the earth is viewed from a considerable distance away it would appear as a blue planet. . . . At times it looks pretty blue to some of us from right

The President's mother declares her son has not told her anything about his third term ambitions. . . . Most children are secretive with their parents, particularly when they are up to mischief. . . .

Merrily boils the political pot....

And the unmistakable scent of apple-sauce pervades the entire country....

About all we need now to fix things up is a ways and means to limit the country's moron supply. . . .

A Florida hermit, 90 years old, has never seen an automobile, says a newspaper story. . . . That explains why he is 90 years old!

A politician is skilful when he convinces the voters that black is white.

. . . But he's a marvel when he can make his wife think the same thing. . . .

Now that the President has an eighth grandchild named Franklin Delano Roosevelt, our grandchildren may have the same opportunity we had to vote for a Roosevelt for President....

A G-man asserts that crime costs the United States more than taxes.... That's all very well, but haven't taxes become almost a crime themselves?...

When the New Deal does something about the hot weather, poison ivy and the tendency of people to fall in love, most of us will be willing to admit that it is really running the country. . . .

The next time your creditors' bills come in, try sending them a note patterned after those sent the United States by its former allies every three months telling us they can't make the war debt payments. . . The supercilious but polite regret is guaranteed to awe the most active bill collector. . . .

The Treasury announces the new public debt figures. . . . And a few days before that the Bureau of Printing and Engraving makes known that it has purchased 125 new presses capable of turning out \$136,250 in currency every twenty-five seconds. . . .

Things aren't so bad yet.... Despite Harry Hopkins, only about 300 out of 4,000 WPA workers in Sioux City voted for Representative Otha Wearin for Senator....

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

MODERNIZED MINING-

The Means to Regain Lost Markets

COAL MINING is not a dying industry; in fact, it is very much alive. But it is suffering from the effects of a long series of struggles over a long period of years against competing fuels, declining markets, labor troubles, freight rate controversies, high taxes, and politics. To successfully oppose such a combination of forces there was needed the effort of a united industry; but after several attempts over the years had failed to secure a concerted action or a fair measure of unity within the industry, the internal situation was accepted as inevitable and it became customary to say that in coal mining the "law of the jungle" must always prevail.

The Law of the Jungle

Now this was good fighting talk, but in reality it was making a virtue of necessity because jungle law is not a particularly desirable law to live and work under-as all coal men know. Furthermore, we must not overlook the point that jungle people have never been able to stand against the superior weapons of civilization, and while we don't want to carry this comparison too far, we might simply mention that a miner with pick and shovel is up against a pretty tough proposition when he has to compete against a well drilling machine. Just how tough this has proven to be is indicated by the coal and oil production figures for the first seven months of 1938. Coal production was 30 percent less than it was a year ago, while crude oil was down only 3.2 percent.

It may be a long time before all of the conflicting interests in coal mining can be reconciled and a high state of By G. B. SOUTHWARD

Mechanization Engineer

American Mining Congress

unity reached, but fortunately the industry is not marking time while waiting for that to occur. The fact that 94,000,000 tons of coal were produced with mechanized loading in 1937, and that 65,000,000 tons were prepared by mechanical cleaning shows the extent to which machine methods are being used by coal to compete against the highly mechanized operations of other fuels. Besides these two outstanding developments in mining, high-capacity cutting machines, heavy haulage locomotives, large steel mine cars, well-constructed track are additional indications of how modernization is affecting the underground operations. Improvements in power lines and ventilation furnish additional evidence that the coal industry has accepted the challenge of competing fuels and through the application of science and invention will recover much of the ground that has been lost.

Modernization Has Only Begun

As every coal man knows who has tried it, there is much more to the adoption of machine methods than the simple purchase of equipment. It all seems very easy on paper, and the progress that has been made so far is really very spectacular; but actually all that has been accomplished is a demonstration that mechanical power can be applied to the extraction and preparation of coal. The industry has not yet developed modernization to the point of justifying much talk about widespread division of profitseither to capital or to labor. Neither has it reached the point where it can materially reduce the general price level to the consumer. But these benefits are on the way, and through further improvements in equipment and operating technique, the day may not be so far distant when coal can surpass its competitors, both in price and quality of the product.

The only possible way for coal to retain its present markets and regain some of the tonnage lost to other fuels is through the medium of lower production costs. Any scheme or proposal to rehabilitate the coal industry that does not take this basic fact into account is facing certain failure, because increased costs mean higher prices, which will inevitably be followed by more lost markets and added

disemployment.

To increase profits and increase wages is a highly desirable objective, but neither of these ends can be attained except through raising the performance efficiency of the mining operations.



Main Line TRACK INSPECTION and Maintenance

A Report Prepared by the Committee on Coal Mine Haulage Roads

THE selection of proper materials and employment of appropriate construction methods can insure the installation of high standard main haulage tracks, but without an adequate program of inspection and maintenance such high standard will be short lived.

Track inspection consists of the observation and notation of those defects which cause track failures. Maintenance must include the prompt and proper correction of these defects. Among the most common causes of track failure, together with manner of correction, are the following:

Road Bed and Drainage

One low joint or low rail may cause misalignment. Lurch of the trip and consequent excessive pressure of the wheel flanges against the rail head at the low spot tends to throw the track out of line.

1. Low joints. Caused by loose track bolts, worn angle bars, loose ballast, inadequate drainage, or wheel hammer due to different degrees of wear on rail heads. Remedy: Replace defective material, drain if necessary, raise joint and retamp ballast.

2. Low rails. Caused by loose ballast, grade subsidence, or inadequate drainage. Remedy: Drain if necessary, install additional ballast, raise track, and tamp ballast.

Loose ballast. Caused by improper tamping. Remedy: Place additional ballast when necessary, raise track, and tamp thoroughly.

4. Tie pumping. Caused by inadequate drainage. Remedy: Make permanent provisions for removal of water, place additional ballast, raise track, and tamp thoroughly.

5. Grade subsidence. Caused by soft bottom and inadequate drainage. Remedy: Drain all possible. If complete removal of water cannot be effected, install a timber grill on top of subgrade; ballast on top of grill.

6. Heaving bottom. Caused by action of air on some types of bottom, or by weight of overburden transmitted through pillars to soft pavements. Remedy: Lower the subgrade

6 to 12 in., dependent upon degree of heaving, and fill in with ballast material. Line and resurface properly, leaving the track 2 to 3 in. below grade.

7. Center-pack. Caused by improper tamping under center of ties, by using too short ties or by loosening of ballast under rails and tie ends. Remedy: Loosen ballast under center of track and tamp firmly under rails and at ends of ties. If necessary, install longer ties.

8. Wet road bed. Causes outlined under the above factors contributing to bad track clearly show that probably the most important cause of track failures is water or wet road beds.

Drainage must be cared for continuously.

Ties

1. Decay is caused by low forms of plant life called fungi. Ties showing fungus growth should be checked for decay and replaced when found unserviceable. Where track life warrants, install treated ties.

2. Splitting usually occurs between the spike and end of the tie. If splitting is of such extent that the spike cannot be redriven where it will hold effectively, replace the tie.

3. Rail cutting. Usually occurs in the softer woods. It is caused by soft bottom, loose spikes, and rail tilting



under passing trips permitting the edge of the rail base to work into the tie. Remedy: Drain bottom where necessary. When not excessive, tie may be turned over and respiked on uncut surface. When excessive, replace the tie. Rail cutting may be the result of a combination of adverse factors which can only be eliminated by the installation of tie plates.

Rail

1. Improper gage. Misalignment and bad surface are the foremost causes of improper gage. Loose fastenings or excessive wear are also causes. Correct line and surface, respiking or removing worn rails where necessary.

2. Loose spikes. Caused by rotting ties, misalignment, use of undersized spikes, by shock of derailments, improper spiking, etc. Remedy: If tie is sound, reline track where necessary, remove and redrive spikes, being careful to plug old spike holes.

3. Broken rails. Caused by derailments, gapping rail ends, use of old and crystallized rail, or by too large tie spacings. Remedy: Either drill the rail to take full-sized, full-bolted angle bars, or replace it, installing additional ties if spacings are too long.

4. Rail creeping. Factors tending to promote creeping are loose spikes and bolts, long spaces between ties, yielding subgrade and lack of drainage. Remedy: Elimination of above causes.

Turnouts

Inspection should include a thorough examination of all turnouts, particular attention being given to the following:

1. Head rod throw. Check distance for correctness.

2. Heel spread. Check distance for correctness.

3. Switch rod clips. See that they are not cracked and that bolts or rivets are tight.

4. Switch point heel fastenings. Examine spiking and see that connection to closure rails is satisfactory.

5. Closure rail fastenings. See that closure rails are securely spiked, particular attention being given to the switch heel end of the curved rail.

6. Frog fastenings, spikes, and bolts. Examine for security.

7. Guard rail fastenings. See that these are tight, and that proper stock rail clearance exists.

8. Switch throw adjustment, particularly where spring connecting rods are used. The switch throw must exert equal pressure on switch points when they are closed against either stock rail.

Miscellaneous

1. Bonding. All bonded tracks should be frequently inspected for loose or broken bonds and repairs made immediately.

2. Clearance. Good clearance can be destroyed by track swing, improper setting of posts, or improper placing



of material along the sides of the haulage way. Lack of clearance should be corrected at once to prevent accidents or derailments.

3. Lubrication. Switch slide plates and switch stands should be kept well

4. Cleanliness. Haulage ways should be kept clean and not used as material storage places. Switches should be kept clean and free from coal, ballast, and other materials to a depth of 2 to 3 in. below the top of ties.

—Submitted by C. C. Hagenbuch, Committee on Coal Mine Haulage Roads.

POWER COSTS for COAL MINES

A Summary of Trends in the Southern Appalachian Field

THE tabulation of power data given below is extracted from statistical surveys that have been made annually for a number of years, covering more than 150 mines in West Virginia, Virginia, and Kentucky. Averages for certain groups, classified according to tonnage production taken over the past five years, are submitted here as being indicative of recent trends in the use of electric power in coal mining. A study of the complete statistics for 1937 as compared with previous years shows a number of interesting developments which are summarized herewith.

1. The most noticeable trend in the

latest analysis is the general and consistent reduction in the cost of power per kilowatt-hour. Some of this has been caused by an improved use of power and the maintenance of higher load factors—that is, lower peak demand in proportion to the kilowatt-hours used. The reduction has also been accentuated by the adoption, for a full year, in certain districts of the large area covered, of a power tariff which emphasizes lower energy charges and higher demand charges.

2. As a few mines in each tonnage class have attained record low cost per kilowatt-hour purchased, there is hope that the average power cost can be lowered still further in the future, principally by reducing the power demand created.

3. A startling feature of this year's analysis is the considerable increase in power use per ton for practically all tonnage classes. This is due, principally, to increased haulage and ventilation requirements as the mines grow longer and few new mines are opened. There is no general increase in the amount of machinery used except in the larger mines where the increased power use is also greater.

4. Power cost per ton has been generally reduced despite increased power use per ton, except in the larger mines

ANALYSIS OF POWER COSTS OF COAL MINES

AVERAGES FOR FIVE YEARS, 1933 TO 1937

COMPILED FROM STATISTICS COVERING MINES IN WEST VIRGINIA, VIRGINIA, AND KENTUCKY

Average for	Number of Mines	Monthly Tonnage	Substation Capacity K.W.	Average Monthly K.W.H. Purchased	Average Monthly Power Charge	Total Cost per K.W.H.	K.W.H. per Ton Coal	Power Cost per Ton	D.C. Hp. Connected per K.W. Substation Capacity	Tons Coal per Total A.C. Hp. Connected
			M	ONTHLY TON	NAGE CLASS	0 то 5,000 Т	ONS			
1933 1934 1935 1936	20 23 24 11	3,547 3,744 3,452 3,871	159.21 146.25 145.45 154.54	19,774 22,822 20,748 20,146	\$473.42 527.16 478.51 476.76	\$.0239 .0231 .02306 .02367	5.58 6.09 6.011 5.204	\$.1334 .1408 .13861 .12316	3.13 2.46 2.318 2.058	11.82 13.32 13.04 13.08
1937	10	3,360	144.44	24,992	524.43	.02098	7.438	.15610	1.906	9.83
			Mon	THLY TONNA	GE CLASS 5,0	00 то 10,00	0 Tons			
1933 1934 1935 1936 1937	30 31 34 33 28	7,601 7,384 7,534 7,799 7,544	193.65 220.37 223.03 183.33 186.92	35,489 39,915 40,681 42,297 40,575	733.42 865.66 865.81 872.88 814.18	.0207 .0217 .02128 .02064 .02007	$\begin{array}{c} 4.67 \\ 5.40 \\ 5.40 \\ 5.423 \\ 5.379 \end{array}$.0964 .1172 .11492 .11192 .10793	2.45 2.45 2.489 2.505 2.541	20.01 16.86 17.43 19.42 19.16
			Mon	THLY TONNA	GE CLASS 10,	000 то 20,00	0 Tons			
1933 1934 1935 1936 1937	50 49 45 40 45	14,533 14,887 14,050 14,314 14,474	299.50 334.10 341.31 298.75 310.72	68,504 77,602 75,956 74,674 78,446	1,285.33 1,428.28 1,388.67 1,350.57 1,364.75	.0188 .0184 .01828 .01809 .01740	4.71 5.21 5.406 5.217 5.420	.0886 .0959 .09884 .09435 .09429	2.66 2.85 2.40 2.766 2.688	24.92 24.76 22.04 25.44 22.82
			Mon	THLY TONNA	GE CLASS 20,	000 то 30,00	00 Tons			
1933 1934 1935 1936 1937	32 33 36 34 27	24,317 24,275 24,684 24,706 24,954	420.40 486.80 507.14 443.38 463.89	121,643 135,391 131,672 128,514 135,164	2,017.38 2,222.60 2,203.16 2,094.45 2,096.32	.0166 .0164 .01673 .01630 .01551	5.00 5.58 5.334 5.202 5.417	.0830 .0916 .08925 .08477 .08401	2.70 2.61 2.705 2.602 2.819	26.64 23.29 24.27 24.30 26.11
			Mon	THLY TONNA	GE CLASS 30	000 то 60,00	00 Tons			
1933 1934 1935 1936 1937	19 14 18 26 32	40,618 41,239 39,640 39,339 39,607	737.50 681.80 750.00 607.69 660.94	206,018 194,503 201,250 168,634 196,477	3,163.69 3,020.35 3,234.89 2,789.04 2,861.18	.0154 .0155 .01607 .01536 .01456	4.84 4.72 5.077 4.617 4.961	.0743 .0732 .08161 .07090 .07224	2.84 2.73 2.489 2.713 2.815	27.31 27.13 24.13 30.61 28.09
			M	ONTHLY TON	NAGE CLASS	OVER 60,000	TONS			
1935 1936 1937	3 5 5	67,661 75,801 90,546	1,116.00 1,120.00 1,277.00	281,403 306,966 489,048	4,215.31 4,410.54 5,854.44	.01498 .01437 .01197	4.159 4.050 5.401	.06230 .05819 .06466	3.061 2.810 2.622	27.51 38.11 36.54

	PRIVATE STEAM PLANTS									
Average for	Number of Coal Companies	Average Monthly Tonnage	Steam Plant K.W. Capacity	Monthly Fuel Cost	Monthly Operation Labor Cost	Monthly Supply and Repair Cost	Total Monthly Cost	Cost per Ton	Total Hp. Connected per Steam K.W.	Tons Coa per Hp. Steam Plant
1933	14	18,204	586.10	\$625.29	\$473.39	\$238.79	\$1,175,71	\$.0646	2.71	26.93
1934	15	21,680	567.60	743.47	697.65	434.57	1.605.92	.0742	2.72	25.69
1935	15	25,380	800.42	810.10	816.55	295.42	1.873.61	.07382	2.708	22.24
1936	11	34,094	990.50	833.78	1.047.90	436.87	2,238.96	.06567	2.466	23.75
1937	12	37,062	956.50	889.58	1,279.10	678.06	2,724.28	.07351	2.586	25.42

where mechanical loading is being substituted for hand loading. More machinery has been added at the larger mines, thus explaining their increased power use and cost per ton, but, because of the flat nature of the power loads at these operations and the excellent elimination of the expensive power demand, the cost per kilowatt-hour has been made much lower. Lower power cost per ton was not due to greater tonnage output because mines of the same average size were considered.

5. Another noticeable improvement

is that the coal mining companies are now using their machinery to better advantage, which is very probably brought about by the retirement of old and obsolete units.

6. There are fewer small companies included in this analysis and more companies producing over 30,000 tons. This effect is due to the nation using more coal in 1937.

7. In general, there is a continued tendency to reduce relatively the substation capacity required. This is a very healthful indication.

8. Each year the height of the coal seams being mined tends to become lower than in the previous year.

-Submitted by H. P. Musser, Committee on Underground Power.

EDITOR'S NOTE: The tabulated figures submitted here are taken from annual power surveys that have been made by Mr. Musser, consulting engineer, and his associates. Their complete surveys show the data at individual mines, but for lack of space only the various group averages are given with this report. The detailed statistics have been sent, through the courtesy of Mr. Musser, to all committee members of our Coal Division.

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WHEELS of Government

• As Viewed by A. W. Dickinson of the American Mining Congress

RETURNING via the Panama Canal from the Pacific fishing grounds near the Galapagos Islands, the President landed early in August at the Navy town of Pensacola, on the Gulf. Inland he proceeded to participate in the senatorial campaign in Georgia, expressing favor for the political opponent of conservative Senator Walter George, to which the Senator replied as he shook the President's hand, "I accept the challenge!" From that mo-ment the Georgia campaign has blazed with the oratory and high feeling for which the South is noted. Senator George has made reference to "another Sherman's march," the hard word "carpetbagger" has been used, and the racial issue has been raised.

In Maryland the Administration opposition to the renomination of Senator Millard Tydings, whose voting record in the Senate parallels that of Republican Senator Vandenberg of Michigan, has precipitated another violent contest. These situations, coupled with the attitude toward Senators Smith of South Carolina and McCarran of Nevada, are sure to have an influence on the conduct of affairs in the coming 76th session of Congress. The defeat of these four Senators and of Chairman John O'Connor of the House Committee on Rules would mean a docile Congress, but if the beleaguered legislators are returned to Washington by their people, the Congress will surely be even more resistan to the desires of Administration advisers than in the congressional sessions of 1937 and 1938.

Taxation

The report on economic conditions in the South, made public the day the President landed at Pensacola, was none too well received by long-established residents in that area, who know full well the economic status of their country and the reasons for it. An insight into the thoughts of astute Southerners may be had by studying the remarks made by Senate Finance Committee Chairman Pat Harrison and House Ways and Means Commit-

tee Chairman Robert Doughton, after a recent White House conference in Washington. Realizing that the Treasury is engaged in a search for additional sources of revenue, Senator Harrison still maintained his opposition to any attempt to reenact the undistributed corporate profits tax in its original form. Of this tax Chairman Doughton said, "We have had one fight on that and I hope that we won't have to get into another." He maintains that what the country really desires is curtailment of present heavy Government expenditures and reduction of the national debt. Mr. Doughton further said, "I am hoping we won't have to increase any taxes materially. We have raked and scraped the field pretty well already . . . and I hope it will not be necessary to broaden the base and increase taxes in the middle brackets."

The Administration attitude on the undistributed corporate profits tax was indicated in June when the President refused to approve the Revenue Bill of 1938, which became a law after the lapse of the statutory ten days-without his signature. The feeling of the two chairmen of the Senate and House committees which will handle the Revenue Bill of 1939 indicates their firm belief that they have the support of their constituents as well as that of the other Southern legislators, and that they are not in sympathy with the Administration's desire for the restoration of the undistributed corporate profits tax. For Mr. Doughton this is a wide departure.

In the meantime, Under-Secretary of the Treasury Roswell Magill is completing his studies and recommendations on proposals for the Revenue Bill of 1939, preparatory to retiring to private life. It is understood that, in addition to the anticipated reenactment of the many excise taxes, serious consideration has been given to the

possibility of procuring revenue through broadening the base of income taxes and reducing exemptions, as well as through bringing tax-exempt securities under a taxable status.

Wage-Hour

Following the induction into office in mid-August of Administrator Elmer Andrews of the Wage-Hour Division, Department of Labor, the work of organizing the Division is under way. Immediately upon the return of the President from his Southern trip, he conferred with Secretary of Labor Frances Perkins and Administrator Andrews for the purpose of speeding up the administration of the Act, which becomes effective October 24, 1938. Mr. Andrews has acted quickly in arranging the setup of the industry committee for textiles, and has announced the selection of Donald M. Nelson, vice president of Sears-Roebuck & Company, Chicago, and a former N. R. A. official, as chairman of the committee, representing the public. It is understood that the committee will be made up of 21 representatives of management, labor, and consumers.

Many questions remain to be ruled upon by the Wage-Hour Division. It will be necessary to define "seasonal industries," as well as "wages" and "bona fide executives, administrative and professional workers." There is embarrassment to the Wage-Hour Division in the requirement that representatives of employes be certified as bona fide by the National Labor Relations Board. Here, in a measure, we have a dual administration of one law by two agencies of the Federal Government, and the Wage-Hour Division would be happier if the National Labor Relations Board certification provision had not been inserted in the law. It is hardly to be expected that the regulations governing the administration of the Act will be available by October 24, but the Division is making a determined effort to meet this date.

For additional details see item entitled "Questions on the Wage-Hour Bill Answered" on page 54.

Labor Relations Board

This much-criticized agency has received a setback in the case of the Idaho-Maryland Mines Corporation in a Federal Court in California. The mining company produces gold and a small amount of silver which is sold to the United States Mint in San Francisco. The attempt of the National Labor Relations Board counsel to classify this production as interstate commerce was flatly rejected by the court, as was also the allegation that the purchase of mining supplies brought the property under interstate commerce.

The Administration Commission which has been studying experiences under the labor laws in Great Britain and the Scandinavian countries, has completed its field work and will report this fall. Senator Edward R. Burke of Nebraska, who is an outspoken advocate for the amendment of the National Labor Relations Act, is now studying European labor relations and will address the Metal Mining Congress in Los Angeles, October 27, on the subject, "Labor Relations at Home and Abroad."

Monopoly

The temporary National Economic Committee under the chairmanship of Senator O'Mahoney of Wyoming, is still engaged in correlating information in the hands of executive agency members from the Departments of Justice, Treasury, Commerce, Labor, the Securities and Exchange Commission, and the Federal Trade Commission. Senator O'Mahoney returned to Washington in the latter part of August, but it is thought that there will be no hearings before the Committee until late in September. It is said that there is sufficient material now in the hands of the Committee to carry on the study for a long time.

The publication of a memorandum furnished to the Committee by Assistant Secretary of State A. A. Berle, Jr., known as an Administration adviser, has been viewed with much interest by those who are concerned with the Committee's studies and intentions. Mr. Berle's report reflects much sober thought, and plainly expresses the desire that the temporary National Economic Committee shall use extreme care to avoid any action tending to

disturb or disrupt the normal conduct of business and industrial enterprise.

Bituminous Coal

The determination of \$2.157 as a weighted average cost of producing coal in the Appalachian fields of the Eastern United States is an interesting milestone in the pressure being exerted by the National Bituminous Coal Commission toward the ultimate proclamation of minimum prices for the industry. Minimum price area No. 1 comprises Districts Nos. 1 and 2, located in central and western Pennsylvania; District No. 3, in northern West Virginia; District No. 4, comprising the state of Ohio; District No. 5, Michigan; District No. 6, the West Virginia Panhandle; District No. 7, the Smokeless Fields of West Virginia and the coal-producing counties of Virginia; and District No. 8, which includes the southern producing fields of West Virginia and the eastern fields of Kentucky, as well as the northeastern producing fields of Tennessee. The District Boards for these areas have been asked by the Commission to propose prices based on this weighted average cost determination for the area of \$2.157. The production cost figures used in this determination were those of the last three months of 1937 and the first six months of 1938. As the Commission's work goes on, coal producers are continuing to organize marketing corporations similar to Appalachian Coals, Incorporated, in the large producing areas of the country, with a view to being prepared for whatever may happen following the publication of the minimum prices, which is anticipated some time this fall.

At the hearings conducted in the middle of August by the Committee for Reciprocity Information on the proposed Venezuelan foreign trade agreement, anthracite and bituminous producers registered vigorous protest against the importation of Venezuelan fuel oil and particularly against any reduction in the 1/2c per gallon import excise tax on crude petroleum and fuel oil, put into effect in the Revenue Act of 1932. Venezuelan fuel oil in 1937 is estimated to have displaced about six million tons of bituminous coal and to have taken over six and one-half million dollars in wages away from American miners. In the anthracite region, thirteen million tons of annual production are estimated to have been lost to petroleum, and Venezuelan oil is charged by anthracite producers with the responsibility for a large part of this loss because so much of the market territory normally served by anthracite lies close to the eastern seaboard. There is no doubt that the Venezuelan representatives who are negotiating with our State Department will press very strongly for a reduction in the duty on fuel oil, since it constitutes by far the principal export of the country.

The new Federal Trade Commission Building, where the executive offices of the Temporary National Economic Committee are located

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SEPTEMBER, 1938

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Eagle Picher's New Garrett Shaft

(Continued from page 15)

on the pipe, closed and left until ready to cement. Some rounds were such that practically all of the test holes required cementing, and some rounds found no water. After the cement had set 72 hours, the regular round was drilled to break about 4 ft., leaving about 5 ft. below the round, which should be sealed. By this procedure it was generally possible to drill the first 3 ft. of the holes dry, assuring getting the 1½-in. pipes securely shingled in before encountering water.

Procedure Changed When Drift Was Started

This procedure was continued until a depth of 439 ft. was reached. A narrow drift was started on the 435-ft. level toward the ore body about 100 ft. away. Two rounds were pulled on this drift. A corner was left in which a pump could be hung and still be out of the way of the force of blasting should the big water be encountered and it be necessary to install the pump before driving the drift further. In short, this was the first moment we were ready for the water in case it was encountered. Of course, the plan was to drive the drift dry as far as possible, but everything was ready just in case. It was realized that driving the drift was more hazardous than sinking, due to the weakness of the flat-lying flint beds in the roof and floor of the drift.

On the morning of June 13, 1938, while drilling the sump holes for the third round of drift, water pressure from underneath pushed up a portion of the drift floor and let in about 250 gal. of water per minute. That meant the time had come to pump.

Letting in such a small quantity of water, which was not nearly as much as the capacity of the pump we expected to install, was unfortunate. The pump installed is a 10-in., 16-stage Peerless, with a 200-hp. motor and having a capacity of 1,450 gal. per minute. Upon starting, the pump completely dewatered the shaft in 1 hour and 55 minutes. The drift will be continued until the water broken into equals the capacity of the pump, in which case it will be necessary to prolong the pumping until the ground is dewatered and we can get on the bottom again.

Ore Strike at Butte Highlands

A rich body of gold ore recently was opened up by the Butte Highlands Mining Company, in the Highland Mountains, 18 miles south of Butte, Mont.

The recent discovery is on the 725-ft. level, the deepest, opened only a few weeks ago. On that level the ore was cross cut for a width of 22 ft., without the footwall being encountered. Assay value over the 22 ft. is reported to run \$38 per ton in gold.

Sunday Lake Shaft Deepened

The Brotherton shaft at the Sunday Lake iron mine of Pickands, Mather and Company, in the Wakefield district, Michigan, is being deepened an additional 150 feet. When this work is completed, the shaft, used for men and material, will have a total depth of 2,000 feet.

A drift will be driven out on the 2,000 level under the Sunday Lake shaft, used for raising ore at the property, and a raise will be driven 150 feet to put this shaft on the same level as the Brotherton.

Anaconda Wage Contract Extended

Miners and smelter men at Butte, Great Falls, and Anaconda have voted to retain the present wages contract with Anaconda Copper Mining Company, thus extending the contract to October 1, 1939.

Montana Miners Meet at

Mine financing was the principal topic of discussion at the annual convention of the Mining Association of Montana, held in Dillon, Mont., August 5 and 6.

Principal speakers at the meeting were Dr. Day Karr, regional administrator of the Eighth Division of the Securities and Exchange Commission, who addressed the gathering on the subject, "The Securities Act of 1933 and Its Application to Mining Securities," and August Grunert, secretary of the Mining Association of Montana and formerly supervisory engineer of

the Reconstruction Finance Corporation at Butte, who spoke on the subject, "Reconstruction Finance Corporation Loans to Mining Companies."

Dr. Karr outlined briefly the principal functions of the SEC, and dwelt particularly on the numerous exemptions that are especially significant to small mine operators. In concluding his remarks, Dr. Karr said: "It must, therefore, seem that the need for adequate disclosure of information increases in importance as the speculative boundaries of the enterprise are widened. Losses are never easy to take; losses are sure to occur, but losses resulting from deception are within control. To the extent that those losses can be removed, both industry and the investor are served. problem is not ours alone, it is yours. That we may assist in solving the problem is our earnest desire. And that its solution is of greater importance to your industry than any of us realize is our sincere belief."

Addressing the gathering on its closing day, Carl Trauerman, president of the Mining Association of Montana, expressed the belief that the construction of smelters by the Federal Government or with Federal funds is highly impractical. He also expressed the hope that the association may hasten a settlement of labor difficulties that resulted in the present shutdown of the East Helena smelter.

Resolutions adopted at the meeting advocated: (1) A cessation of further exemptions of assessment work; (2) maintenance of the existing 15 percent allowance for mine depletion; (3) increase in import tariffs on ferro-alloy ores and metals; (4) no reduction in present tariff on copper, lead, and zinc; (5) establishment in the United States of a Department of Mines with Cabinet portfolio; (6) active continuation of negotiations aimed at lower freight rates to outside smelters during present emergencies; (7) Federal aid for roads of mutual benefit to forest service and the mining industries within the National Forests; (8) liberalization of RFC mining loans; and (9) modification or amendment of the Wagner Act to the end that the National Labor Relations Board may be an impartial tribunal to whom employers and employes may appeal on an equal footing.

Carl J. Trauerman, Butte, was reelected president of the Association. Other officers elected were: Harry C. Bacorn, first vice president; Charles R. Brazier, second vice president; August Grunert, secretary-treasurer; and Dr. Francis A. Thomson, chairman of the executive committee.



Orange groves and towering mountains typify the Los Angeles area

Los Angeles to Draw Throngs of Metal Mining Men



THOMAS H. O'BRIEN National Chairman Program Committee

THE pulse of metal mining activities throughout the country has quickened and strengthened, following the moderate but healthy upturn in general business, and this has been accompanied by ever-increasing interest, on the part of mining men, in the forthcoming Fifth Annual Metal Mining Convention and Exposition to be held at the Ambassador Hotel, Los Angeles, October 24 to 27. Sponsored by the Western Division of the American Mining Congress, chairmanned by Stanly A. Easton, president of the Bunker Hill and Sullivan Mining and Concentrating Company. These annual meetings, held in prominent western mining centers, are now regarded as the foremost event on the industry calendar.

Growth in attendance at these events attests to this fact—a marked and steady increase having been recorded until last year at Salt Lake City a vast crowd of nearly 2,000 taxed hotel facilities to the limit. So plentiful are the hotels in Los Angeles, however—both large and small, to suit individual tastes—that guests are assured comfortable accommodations of whatever type they desire.

Program Virtually Complete

Keynoting this meeting, as in years past, will be discussions by foremost leaders on vital economic, fiscal, tax, tariff, labor, safety, and operating problems faced by the industry today. The national Program Committee, headed by T. H. O'Brien, vice president and general manager, Inspiration Consolidated Copper Company, has virtually finished its long task of choosing subjects and speakers, only a few "tentatives" remaining on the preliminary program shown on page The timeliness of all the subjects and high caliber of those presenting them is fitting testimony to the studied attention given the matter by Mr. O'Brien and his committee members.

Of particular interest to the entire gathering will be the talk by Senator Edward R. Burke, of Nebraska, on the subject, "Labor Relations at Home and Abroad." Senator Burke, a strong proponent of independent legislative action, has devoted much of his time for several months to a careful study of defects in present national labor legis-



H. S. MUDD Welcoming



H. W. HOWE



G. A. JOSLIN Hotels



JULIAN BOYD

lation, and to an analysis of laws and experience dealing with labor matters in the United States compared with various European countries. It is expected by close observers in Washington that he will champion sorely needed revision of the Wagner Bill in the next session of Congress.

Another special treat in store for Convention visitors is the symposium on the present economic status and outlook for major and minor metals and the principal non-metallics, discussed by such prominent leaders as Senator Key Pittman, of Nevada; Howard I. Young, Stanly A. Easton,

R. C. Allen, R. M. Hardy, and John W. Finch. With such keen interest currently displayed in rapid developments in Philippine mining, the Convention is fortunate in having the acceptance of Judge John W. Haussermann, Benguet Consolidated Mining Company, to relate some of their principal mining problems. Other authorities included in the program to date include: Robert M. Searls, Newmont Mining Corp.; Hon. Oscar L. Chapman, Assistant Secretary of the Interior; Victor J. Hayek, Mining Association of the Southwest; Robert S. Palmer, Colorado Chapter, American Mining Congress; Samuel H. Dolbear, chairman of the American Mining Congress Committee for Cooperation with the Securities and Exchange Commission; Chester T. Lane, General Counsel,

Securities and Exchange Commission; Howard N. Lary, Regional Administrator, Securities and Exchange Commission; Paul Klopstock, Austin Silver Mining Co.; Church Holmes, Sunshine Mining Co.; Harley A. Coy, American Zinc Co. of Tennessee; Judge Edgar T. Zook, Idaho Maryland Mines Co.; Evan Just, Tri-State Zinc and Lead Ore Producers Association; Thomas E. Campbell,

Mining Exhibits, Inc.; William B. Daly, Anaconda Copper Mining Co.; James A. Caselton, St. Louis Smelting & Refining Co.; H. C. Henrie, Phelps Dodge Corp.; Ellsworth C. Alvord, Counsel, American Mining Congress; and Granville S. Borden, San Francisco, Calif. Ample time for floor discussion of all the papers has been allowed, and all those interested in any of the subjects are urged to wave modesty aside and give the audience the benefit of their views.

A most important adjunct to the program, and intimately allied with it, will be the formulation

of a Declaration of Policy—resolutions prepared by a representative cross-section of the entire metal mining industry and submitted to the Convention, covering the relationships of mining to the National Government.



ROBERT LINTON Chairman, General Committee on Arrangements

Arrangements Being Pushed

Full plans to assure guests a week of solid enjoyment in Los Angeles are being pressed into final shape by the General Committee on Arrangements, headed by Chairman Robert Linton, consulting engineer of Los Angeles. Assisting Mr. Linton are the following members of the committee: James E. Babcock, president, Soledad-Mojave Mining Syndicate; Wm. C. Browning, general manager, Golden Queen Mining Co.; Cooley Butler, Butler Bros.; Thomas F. Cole, mining engineer,

Pasadena; Joseph A. Hartley, chairman of the mining committee, Los Angeles Chamber of Commerce; A. A. Hoffman, manager, American Potash and Chemical Corp.; George Holmes, well-known California mining man; W. L. Honnold, mining engineer, Los Angeles; F. M. Jenifer, vice president and general manager, Pacific Coast Borax Co.; Howard C. Kegley, president, Mining Association



The Arizona copper mines are within easy striking distance of Los Angeles—the concentrator and smelter at Inspiration

-Preliminary Program -

MONDAY, OCTOBER 24

MORNING SESSION-WESTERN MINING PROBLEMS

OPENING OF CONVENTION

JULIAN D. CONOVER, Secretary, American Mining Congress

THE RIGHT TO MINE-ITS PROTECTION AGAINST EN-CROACHMENT

ROBERT M. SEARLS, Counsel, Newmont Mining Corp. WESTERN MINING AND THE FEDERAL GOVERNMENT (Speaker to be announced)

OUR PUBLIC LAND POLICY
VICTOR J. HAYEK, Secy., Mining Assn. of the Southwest

COORDINATION OF STATE AND FEDERAL AID TO MINING

ROBERT S. PALMER, Secy., Colorado Chapter, American Mining Congress

APPOINTMENT OF RESOLUTIONS COMMITTEE

LUNCHEON AND WELCOME TO DELEGATES

Presiding: HARVEY S. MUDD, Los Angeles, Calif. WELCOME TO CALIFORNIA

HON. FRANK F. MERRIAM, Governor of California HON. FRANK SHAW, Mayor of Los Angeles RESPONSES

HOWARD I. YOUNG, President, American Mining Congress

STANLY A. EASTON, Chairman, Western Division THOMAS H. O'BRIEN, Chairman, Program Committee Roy L. Cox, Chairman, Manufacturers Division

AFTERNOON SESSION-MINING AND THE SECURITIES AND EXCHANGE COMMISSION

A STUDY OF MINE SECURITY REGISTRATION AND RECOM-MENDATIONS FOR IMPROVING. PROCEDURE A Report of the American Mining Congress Committee for Cooperation with the S.E.C., by SAMUEL H. DOLBEAR, Chairman

THE VIEWPOINT OF THE SECURITIES AND EXCHANGE COMMISSION

LEGAL PROBLEMS

CHESTER T. LANE,* General Counsel, S.E.C.

ENGINEERING PROBLEMS

HOWARD N. LARY, Regional Administrator, S.E.C., Denver, Colo.

A REGISTRANT'S VIEWPOINT OF S.E.C. PROCEDURE PAUL KLOPSTOCK, Chairman of Board, Austin Silver Mining Co.

TUESDAY, OCTOBER 25

MORNING SESSION—NEW DEVELOPMENTS IN THE INDUSTRY

MINING PROBLEMS IN THE PHILIPPINES JUDGE JOHN W. HAUSSERMANN, Pres., Benguet Con- AFTERNOON SESSION-LABOR

solidated Mng. Co. METALLURGY OF THE COEUR D'ALENE SILVER ORES

CHURCH HOLMES, Conc. Supt., Sunshine Mng. Co. IMPROVEMENTS IN CRUSHING AND GRINDING PRACTICE (Speaker to be announced)

SLUSHER LOADING IN DRIVING INCLINES

HARLEY A. COY, Supt. of Mines, American Zinc Co. of Tennessee

FINAL SUBMISSION OF RESOLUTIONS To be referred to Resolutions Committee

AFTERNOON SESSION-LEGAL, TARIFF, PUBLIC RELATIONS PROBLEMS

TO WHAT EXTENT IS MINING INVOLVED IN INTERSTATE COMMERCE

JUDGE EDGAR T. ZOOK, Counsel, Idaho Maryland Mines Corp.
Application of Reciprocal Trade to Mining

EVAN JUST, Secy., Tri-State Zinc & Lead Ore Producers Association PUBLIC RELATIONS OF THE MINING INDUSTRY

THOMAS E. CAMPBELL, Executive Vice Pres., Mining Exhibits, Inc.

WEDNESDAY, OCTOBER 26

MORNING SESSION—HEALTH AND SAFETY

HEALTH CONSERVATION OF THE METAL MINER WILLIAM B. DALY, Gen. Mgr., Anaconda Copper Mining Co.

THE SILICOSIS "RACKET" JAMES A. CASELTON, Vice Pres. & Secy., St. Louis Smelting & Refining Co.

VENTILATION IN DEEP METAL MINES (Speaker to be announced)

ACCIDENT PREVENTION PRACTICE OF PHELPS DODGE CORP.

H. C. HENRIE, Gen. Supt., Copper Queen Br., Mines Div., Phelps Dodge Corporation

AFTERNOON SESSION—PROSPECTS FOR THE METALS

SYMPOSIUM-10-minute talks:

Copper—(Speaker to be announced)

Lead-Stanly A. Easton, Pres., Bunker Hill & Sullivan Mng. & Concentrating Co.

Zinc—Howard I. Young, Pres., American Zinc, Lead

& Smelting Co. Iron Ore-R. C. Allen, Vice Pres., Oglebay, Norton

& Co.

Gold—(Speaker to be announced)
Silver—R. M. HARDY, Pres., Sunshine Mining Co.
Other Metals and Industrial Minerals—Hon. John
W. Finch, Director, U. S. Bureau of Mines

GOLD, SILVER AND INTERNATIONAL EXCHANGE HON. KEY PITTMAN, U. S. Senator from Nevada

THURSDAY, OCTOBER 27

MORNING SESSION—TAXATION

FEDERAL FISCAL POLICIES ELLSWORTH C. ALVORD, Counsel, American Mining

Congress THE REVENUE ACT OF 1938

GRANVILLE S. BORDEN, Tax Counsel, San Francisco, Calif.

THE CANADIAN SYSTEM OF MINE TAXATION (Speaker to be announced)

PROSPECTIVE REVENUE LEGISLATION . (Speaker to be announced)

JOINT LUNCHEON MEETING

BOARD OF GOVERNORS, Western Division BOARD OF DIRECTORS, American Mining Congress

LABOR RELATIONS AT HOME AND ABROAD HON. EDWARD R. BURKE, U. S. Senator from Nebraska SYMPOSIUM ON LABOR LEGISLATION

Participated in by leaders in the mining industry
FEDERAL WAGE-HOUR LAW—APPLICATION TO MINING A representative of Wage-Hour Division, U. S. Dept. of Labor*

REPORT OF RESOLUTIONS COMMITTEE

ANNUAL BANQUET

WESTERN DIVISION, AMERICAN MINING CONGRESS COCOANUT GROVE, AMBASSADOR HOTEL Address: Cornelius F. Kelley, Pres., Anaconda Copper Mining Co.

* Tentative.



WM. C. BROWNING Finance



Y. D. HILLS



M. J. HOLMES



E. O. SLATER

of the Southwest; F. W. Maclennan, vice president, Miami Copper Co.; H. S. Mudd, widely-known mining engineer of Los Angeles; Lawrence K. Requa, consulting mining engineer, Santa Barbara; Dr. L. D. Ricketts, consulting mining engineer, Pasadena; Frank R. Wicks, chairman, Southern Mineral Committee, California State

Chamber of Commerce; and Philip Wiseman, president, United Eastern Mines Corp.

Also participating in this work are the chairmen pictured on the preceding pages, who are in charge of formulating detailed plans for various special activities.

At the Welcome-to-Delegates Luncheon on Monday noon messages of greeting will be given by Governor Frank F. Merriam, of California, and Mayor Frank Shaw, of Los Angeles. Responses on behalf of various groups represented at the Convention will be made by

Howard I. Young, president of the American Mining Congress; Stanly A. Easton, chairman of the Western Division; Thomas H. O'Brien, chairman of the Program Committee; and Roy L. Cox, chairman of the Manufacturers Division. Harvey S. Mudd, widely-known mining man of Los Angeles, heads the committee in charge of this function, and will act as toast-

An open-armed reception typical of Western hospitality is assured all delegates by the spirited endeavors of a committee headed by Major Julian Boyd, Pacific Coast Borax Company. Through activities of a committee chairmanned by Garnett A. Joslin, mining engineer of Los Angeles, guests

may count on well-coordinated services and comfortable and reasonable accommodations at the many hotels serving the convention. Finally and importantly, finances for various phases of the meeting are being handled capably by a committee headed by W. C. Browning, Golden Queen Mining Company.

Royal Entertainment

The warmth of cordial Western hospitality has been a real highlight at the last two conventions, and the Los Angeles crowd promises three nights that they hope will eclipse anything on the amusement bill in the past. Working diligently, the Entertainment Committee, headed by H. W. Howe, of Los Angeles, has already announced a program of unusually attractive evening fea-

Guests will gather Monday night, October 24, for an informal gettogether party, with

dancing to excellent music and a program of entertainment with many novel features. "Get acquainted" is the by-word for this opening night

With few, if any, octogenarians scheduled to be present from California, it would be stretching things a bit to say that the following night will feature reminiscences of early California days - but who hasn't read about the thrilling adventure and romance during the days of Mexican influence? The appealing environment of that time will be revealed to guests in a manner not to be forgotten on Tuesday night, in the quaint foreign surroundings of Olvera Street, a small section with buildings un-

changed from the days when Mexico governed California, with gaiety and merriment such as prevailed in its earliest days.

An open night on Wednesday will afford guests the opportunity of choosing whatever type of amusement particularly appeals to them from the many and varied attractions at hand. The glamor of Hollywood will doubtless bid high for visitations by many of the movie addicts among the delegates.

The Annual Dinner will climax Convention activities on Thursday night, with the world-famous Cocoanut Grove furnishing a beautiful and spacious setting. Guest speaker of this memorable event will be Cornelius F. Kelley, president of the Anaconda Copper Mining Company, who will have a message of vital interest to all. Special entertainment is also being worked up for this gala occasion by a committee headed by M. J. Holmes, of the Braun Corporation.

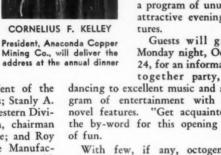
Educational Field Excursions

Under the direction of E. O. Slater. Smith-Emery Company, the Excursions Committee has arranged a program of interest-compelling tours that will meet with enthusiastic approval by delegates.

On Friday, October 28, there will be a trip to the Mojave mining district, with visits to the Golden Queen and Cactus Queen mills and surface plants. Following their recent discovery, these properties quickly developed into gold producers of wide renown.

On Saturday there will be several alternate excursions, including the fol-

- (1) A trip to the underground mine of the Riverside Cement Company, where caving methods are employed for mining limestone.
- (2) A visit to the 13-mile tunnel of the Colorado River aqueduct of the Metropolitan Water



anut Grove at the Ambassador will provide a colorful setting for the annual dinner

Scenic attractions of Catalina Island are easily reached from Los Angeles





District of Southern California. This 16-ft. circular tunnel is a concrete-lined bore through the San Jacinto Mountains about 80 miles from Los Angeles. It has been driven from two shafts and three adits, and is now nearing completion. Both tunnel driving and placement of concrete lining will be seen on the trip.

- (3) A trip to Randsburg and Atolia, visiting the Yellow Aster gold mill and cyanide plant, and the tungsten concentrator of the Atolia Mining Company.
- (4) An excursion around Los Angeles harbor.

Those interested can also make a trip to Mt. Wilson Friday evening and stay all night to gaze at heavenly wonders through the 100-in. telescope at the Mt. Wilson Observatory. It is open to the public only on Friday nights. Coming down Saturday morning, a visit may be made at the California Institute of Technology, where the 200-in. reflector for the Palomar Observatory is now being ground.

Special entertainment is likewise being developed for the ever-increasing number of ladies attending these meetings. The myriads of attractions in and near Los Angeles offer a lucrative field from which to choose a variety of functions that will insure pleasant hours for "the better halves" during the daytime. Details will be announced later.

Exposition a Real Drawing Card

As an integral part of the annual meeting, the Exposition affords visitors a unique opportunity to view at a central location the latest innovations in the thousand and one mining equipment and supply items, both large and small, that are so necessary to continued progress in efficient operationparticularly under present-day conditions. Under the leadership of Y. D. Hills, Timken Roller Bearing Company, the Exhibits Committee is rapidly completing arrangements that will metamorphose the beautiful Fiesta, Spanish, and Colonial Rooms of the Ambassador into a veritable parade of progress in mining machinery, participated in by foremost manufacturers the country over. Equipment and supply pieces running the gamut of the entire mining and milling operations will be there-including such items as locomotives, loading machines, hoists, mine cars, pumps, wire rope, rock drills, explosives, lubricants, ven-



General view of a few of the exhibits at the 1937 Exposition

tilating equipment, safety appliances, crushing and grinding equipment, flotation machinery, etc. Not only will the exhibits be educational from a physical standpoint; indeed, one of the most valued features of the meeting is the opportunity afforded operators to talk over with experts in all equipment and supply lines, the perplexing difficulties encountered in their operations, and to avail themselves of the technical assistance gladly offered.

Being the only national display of its kind in the metal mining field, both operators and manufacturers have been loud in its praises—the rewards are of mutual benefit. Exhibitors to date include the following:

Allen-Sherman-Hoff Co. Allis-Chalmers Mfg. Co. Alloy Steel & Metals Co. Atlas Powder Co. Bethlehem Steel Co. Bucyrus-Erie Co. E. D. Bullard Co. Dorr Company, Inc., The E. I. du Pont de Nemours & Co., Inc. Thomas A. Edison, Inc. The Electric Storage Battery Co. Engineering & Mining Journal Fairchild Aerial Surveys General Electric Co. Goodman Mfg. Co. Hercules Powder Co. Independent Pneumatic Tool Co. Jeffrey Mfg. Co. Kansas City Structural Steel Co. Kueffel-Esser Co. Link-Belt Co. E. J. Longyear Co. Los Angeles Assayers Assn. Los Angeles By-Products Co. Los Angeles Steel Castings Co.

Mancha Storage Battery Locomotive

The Marion Steam Shovel Co.
Mine Safety Appliances Co.
Plomb Tool Co.
Pomona Pump Co.
John A. Roebling's Sons Co.
St. Louis Power Shovel Co.
Sauerman Bros.
Smith Engineering Works
Standard Oil Co. of California
Stephens Adamson Mfg. Co.
The Texas Co.
The Timken Roller Bearing Co.
Traylor Engineering & Mfg. Co.
Western Machinery Co.
Western Precipitation Corp.

Sightseeing Opportunities Unrivaled

Westinghouse Elec. & Mfg. Co.

California, the Golden State, has been justly acclaimed the world over for its varied scenic attractions and its pleasant sub-tropical climate. Towering mountains of the Coast Ranges are only a stone's throw from the orange groves along the Pacific; the beauties of Catalina Island are only a short boat trip from Los Angeles; the incomparable glamour of Hollywood is just around the corner; Yosemite, Death Valley, and Sequoia National Parks, as well as snow-capped peaks of the Sierras, are within easy striking distance while en route to or from the meetings; and the Mother Lode, the immense gold placers of the inland valleys, and the Arizona copper deposits are only a hop, skip and jump.

Mark the dates on your calendar NOW—October 24, 25, 26, and 27, with trips on the 28th and 29th—and start making arrangements to get to Los Angeles—even if you have to thumb your way!



NEWS and VIEWS

Inspiration Increases Operating Rate

The Inspiration Consolidated Copper Company has announced an increase to six days a week operation at its mine, leaching plant, and smelter in Arizona. The rate in effect previous to this increase was five days per week. Approximately 500 employes are affected.

Zenith Ventilation Bore Hole Down 600 Feet

The large ventilation bore hole being drilled at the Zenith iron mine on the Vermillon Range near Ely, Minn., was down to a depth of 600 feet on July 20. Sinking is by means of a Calyx core drill, the hole being 5½ feet in diameter. Ultimate depth will be 1,200 feet. Unusual interest is being displayed in this unique drilling project, a full description of which will appear in our October issue.

Coal Commission Activities

The National Bituminous Coal Commission has orderel all Bituminous Coal Producers' Boards in the central and southwestern states to file proposed minimum prices and marketing rules and regulations for their coal by September 14. All producers' boards in the United States now have received their directions to propose prices and rules and regulations.

The new order directed the boards in Minimum Price Areas 2, 3, 4 and 5 to base their proposed prices on the weighted average cost of producing coal which the Commission announced for these areas as follows: Area 2, comprising Districts 9, 10, 11 and 12, covering Western Kentucky, Illinois, Indiana and Iowa, \$1.772 per ton; Area 3, comprising District 13, covering Alabama, \$2.474 per ton; Area 4, comprising District 14, covering Arkansas and part of Oklahoma, \$3.617 per ton; and Area 5, compris-

ing District 15, covering Missouri, Kansas, Texas and part of Oklahoma, \$2.049 per ton.

These area costs were based on district costs proposed by district producers' boards with the aid of data compiled by Commission statistical bureaus from individual cost reports of producers. A hearing was held on them by the Commission in Washington during July.

The Commission announced costs for and directed proposal of prices from the Rocky Mountain and Pacific Coast regions in July. These were to be filed with the Commission by August 24. It took the same steps for the Appalachian region and Michigan early in August, and these price proposals are to be filed by September 6.

In rules and regulations for the boards to follow in making their proposals, the Commission directed that the prices "shall be f.o.b. transportation facilities at the mine for the kinds, qualities and sizes of coal for which prices are proposed." It set the following standards to which the proposed prices must conform, under provisions of the Bituminous Coal Act of 1937.

"They shall yield a return for the district equal as nearly as may be to the weighted average of the total costs, per net ton, of the tonnage of the minimum price area within which the district is included, as such weighted average of the total costs shall theretofore have been determined by the Commission pursuant to the provision of subsection (a) of Part II, Section 4, of the Act.

"They shall reflect, as nearly as possible, the relative market value of the various kinds, qualities and sizes of the coal to which they are applicable.

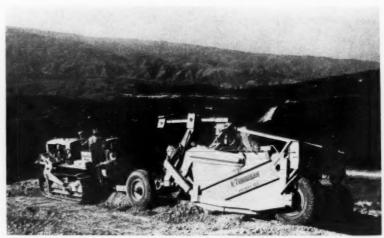
"They shall be just and equitable as between producers within the district. "They shall have due regard to the interests of the consuming public.

"They shall be just and equitable as between producers within the district, for any kind, quality or size of coal for shipment into any consuming market area.

"They shall not permit dumping."

Platinum in Colorado

The finding of appreciable amounts of platinum and palladium in a promising deposit of copper ore in south-



Stripping overburden for clay mining operation with a Caterpillar tractor and LeTourneau scraper near Santa Ana, Calif.

western Colorado is announced by the Geological Survey, United States Department of the Interior. The platinum metals were found by E. T. Erickson during a laboratory study of ores collected by Edwin B. Eckel, who is studying the ore deposits of the La Plata mining district as a part of the cooperative program that has been carried on since 1926 by the State of Colorado and the Federal Survey. Since its discovery in 1873, the La Plata district has produced nearly \$6,000,000 worth of gold and silver, but very little copper.

The platinum-bearing copper deposit lies on Copper Hill, between Bedrock and Boren Creeks, at an altitude of 10,250 ft. about half a mile from the old town of La Plata and 21 miles northwest of Durango. The workings of the Copper Hill mine include a glory hole, or open cut, and a 600-ft. tunnel. Between 1911 and 1917, the mine yielded 2,300 tons of ore, which contained about 4,500 oz. of silver and about 225,000 lb. of copper. It has been idle since 1917.

Details of the findings will be presented in an illustrated paper by Mr. Eckel, entitled "Copper Deposits of the La Plata District, Colo., and Their Platinum Content," soon to be published by the Colorado Scientific Society, at Denver, Colo.

Truax-Traer Safety Meet

It is estimated that between 10,000 and 12,000 persons visited Leewood Park on Cabin Creek, W. Va., to witness the sixth annual mine safety meeting of the Truax-Traer Coal Company and the Cabin Creek Consolidated Sales Company, held on August 13.

The safety and first-aid teams from the Marfork mine of the company, captained by Omar Elkins, won first place in competition with 15 other safety and first-aid teams of the company. The winning team made a perfect score, 1,500 points out of a possible 1,500. Second place was awarded the team from the Raccoon mine No. 2, and third place was won by a team from the United Mine.

The meeting, declared to be one of the largest and most successful ever held in that area, was under the direction of W. R. Perfater, safety engineer for the company, who was assisted by Clarence O. Morris of the State Department of Mines and secretary of the Kanawha Valley Mining Institute.

Among speakers who addressed the

crowd were James Martin, vice president and general manager of the Wyatt Coal Company; Harry Kennedy, of the Kanawha Coal Operators' Association; N. P. Rhinehart, head of the West Virginia Department of Mines; C. R. Moriarty, head of the Cabin Creek Consolidated Sales Company; and Ralph Hartman, of the State Compensation Department.

Interest at the meet was heightened considerably by the presence of A. H. Truax, of Chicago, president of the mining company.

The Truax-Traer Company is one of the largest operations in Kanawha County. Officials who sponsored Saturday's meet, besides Mr. Truax and Mr. Perfater, were Garner Williams, vice president and general manager, and J. E. Chamness, assistant general manager, and Mr. Moriarty.

Red Star Mine Reopened

The Red Star mine of the Star Coal and Coke Company, Red Star, W. Va., which has been shut down since April 1, began operations again early in August. When full production is reached, about 160 men will be employed by the mine. The four months' shutdown was the first caused by lack of a market in the 45 years since the company was founded by George W. and C. T. Jones.

President Approves Plan to Pay Silver Price As Of Day of Mining

President Roosevelt recently approved a recommendation by Secretary Morgenthau that domestic silver mined before midnight, December 31, 1938, and delivered to mints after that hour, be regarded for payment purposes as having been received before that hour, according to a Treasury announcement.

This is in accord with a similar provision made for domestic producers last year. It assures the producer that his newly mined silver will be paid for at the price that prevailed under the President's current proclamation—namely, 64.64 cents an ounce.

Mr. Morgenthau said in a memorandum to the President, "As you know, in the normal course a considerable period of time elapses between the date silver is mined and the date when the refining of the silver has been completed and the silver delivered to a mint."

British Coal Bill Passed

The British Coal Control Act, subject of heated debate for many months in the House of Commons and the House of Lords, has finally been passed.

Originating in the House of Commons, the Act was passed relatively quickly by that body. When it reached the House of Lords, however, members having interest in the royalties that are subject to be purchased by the government by July 1, 1942, for the sum of \$330,000,000 debated the bill at length and tacked on innumerable amendments, one of which would delay the ultimate purchase by the government beyond the year 1942.

However, inasmuch as treasury guarantees are needed for the loans to pay the \$330,000,000, the speaker of the House of Commons had the power to declare this section a money bill. The Lords are not empowered to amend a money bill, so with its vital sections still intact, the measure went back to that House and was finally passed.

Three main purposes of the measure include: (1) government purchase of privately owned royalty; (2) voluntary and compulsory amalgamation of collieries, and (3) protection of consumers.

While the state will have complete control over the industry through its Coal Commission and the ultimate ownership of the coal, it will not actually engage in coal mining. Under the Act, private companies will get all of the coal out, but they will hold their leases from the state, and the state will advise them how to operate for the best interest of the whole industry.

The principal idea is to give the industry every opportunity of organizing itself for efficient production and elimination of overlapping, wasteful competition, uneconomic dumping, and the further development of organized marketing through central selling schemes.

Gold Mining in California Held Intrastate Business

The Fifth Circuit Court of Appeals at San Francisco, Calif., recently refused to enforce a National Labor Relations Board order against the Idaho-Maryland Mines Corporation, holding that gold mining in California is not interstate commerce.

According to the ruling, evidence did not support the NLRB finding that the supplies and equipment purchases gave it jurisdiction, nor could the company be held accountable for shipment of its gold into another State by the Federal Government. The decision stated, "The company buys nothing, sells nothing, ships nothing, and nothing is shipped to it in interstate or foreign commerce."

Because of the importance of the decision, it is likely that the Labor Board will appeal the case to the U. S. Supreme Court.

Consumers' Council Urges New Approach

The Consumers' Counsel of the National Bituminous Coal Commission has informed the Commission that he will demand and "struggle to obtain" for consumers every bit of information which can be obtained to justify prices as finally established.

"The office of Consumers' Counsel," the Commission has been told in a communication, "prays for a more rational approach to the job." The letter which reviews the procedure adopted by the Commission in its approach to the task of establishing minimum prices, points out the necessity for the Commission to establish intra-district coal relationships; a plan of classification which will be more informative to the consumer; and establishing before the record is closed definite information to permit consumers to appraise classification standards.

The Commission has also been asked to insist when determining average weighted costs of production for a "reasonable cost" in selling coal rather than the "actual" cost. Testimony from producers in cost hearings gives "actual" cost while the law, according to the Consumers' Counsel, specifically demands that "reasonable cost" must be determined.

Kennecott to Resume at Ray

The Ray, Ariz., mines of Nevada Consolidated Copper Company, a division of Kennecott Copper Company, resumed operations August 16. The property was closed June 16 in conformance with Kennecott's policy of curtailing copper production until the inventory and price situation improved. Present production rate is about the



Commonwealth lead mine, Melrose, Mont. Compressed air is furnished by Caterpillar diesels driving a Gardner-Denver and a Sullivan compressor—elevation 6,500 ft.

same as before the mine and concentrator closed.

Preparations have also been under way to resume operations at the Hayden, Ariz., copper property which means the reemployment of between 600 and 700 men.

Nevada Consolidated is also resuming work at its pit mine at Santa Rita, N. Mex., thus supplying its usual quota to the concentrator at Hurley.

1938 Minerals Yearbook

The Minerals Yearbook, 1938, compiled by the Bureau of Mines, U. S. Department of the Interior, presenting an economic and statistical review of developments in the mineral industry in 1937, came off the presses late in August and is now available from the Superintendent of Documents, Washington, D. C., for \$2.00. A review will appear in the October JOURNAL.

Marketing Agencies File for Commission Approval

Applications for provisional approval of Fairmont Coals, Inc., and Western Pennsylvania Coal Corporation as marketing agencies were filed August 11 with the National Bituminous Coal Commission by Stephen P. Burke and J. O. Smith, presidents,

respectively, of the two organizations. It is expected that the Commission will set dates within 30 days for hearings on these applications.

Membership of Fairmont Coals, Inc., represents slightly less than 50 percent of the total commercial production in District 3 (northern West Virginia), but it is expected that sufficient operators will sign up before the end of the year to make the total membership comprise approximaely 55 to 60 percent of commercial production. Main office of the organization will be in Fairmont. Other officers of Fairmont Coals, Inc., in addition to President Burke, include: Howard Zeller, Jamison Coal and Coke Company, first vice president; R. A. Courtney, Courtney Coal Company, second vice president; T. E. Johnson, Hutchinson Coal Company, secretary and treasurer; and Tusca Morris, general counsel.

Membership in the Western Pennsylvania Coal Corporation represents 73 percent of the commercial production in the western Pennsylvania district, based on 1937 production. However, if production from captive mines is included, the percentage is lowered to 40 percent. Main office of this organization will be in Pittsburgh, with B. H. Canon, secretary-treasurer. Those elected to the board of directors are: E. W. Bratton, W. J. Curley, Ross I. Davis, J. L. Eysmans, Jr., R. E. Jamison, Julian Kennedy, Jr., Geo. H. Love, E. C. Robertson, J. T. M. Stoneroad, H. M. Wassum, C. S. B. Ward, and F. G. West.

Metals in the Automobile Industry

The importance of the automobile industry as a consumer of metals is strikingly portrayed in the 1938 edition of "Automobile Facts and Figures," recently released by the Automobile Manufacturers Association. Tabulated below are the percentages of total U. S. consumption of the principal metals utilized by the automobile industry:

Strip steel	55.3 percent
Steel bars	34.9 percent
Sheets	44.9 percent
Malleable iron	54.0 percent
Alloy steel	59.7 percent
Steel, all forms	20.0 percent
Aluminum	12.7 percent
Copper	16.8 percent
Tin	12.0 percent
Lead	31.4 percent
Zinc	12.5 percent
Nickel	28.0 percent

Recent reports indicating a general healthy condition in dealers' stocks of new and used cars, together with forecasts of an early upturn in automobile production, are therefore heartening news to the metal industry.

Effect of Vacations on Mine Accidents

The Union Pacific Coal Company recently made an interesting study of accident records during the vacation period compared with the rest of the year, results of which were released in the following news item, run in the August issue of The Employes Magazine, the informative and very readable publication issued by the company for its employes once a month:

"A bad accident record for the month of June led to a study of the relative man-hours of exposure during what might be called the vacation period, June, July, and August, and the non-vacation period, covering the remaining nine months of the year. This study, covering a period of five years, 1933 to 1937, indicates that during the fifteen months of the vacation period, one lost-time accident was suffered to every 56,406 man-hours worked, while during the remaining forty-five months, non-vacation period, 64,342 man-hours were worked for each lost-time accident. In substance, the performance during the non-vacation period was about 14 percent better than that of the vacation period. There are a number of factors that enter into this situation which might be mentioned, such as shifting about of superintendents, mine foremen, and section foremen, and perhaps an unconscious amount of thought given to anticipated and past vacations during working hours, with the result that 'vacation thinking' to some extent takes the place of 'safety thinking.'"

Utah Miners' Wage Agreement

Mine and smelter workers in Utah recently ratified a two years' sliding scale pay agreement with mine and smelter operators in that State. The contract applies to approximately 6,000 employes of every big Utah mining company except the Utah Copper Company. Miners in nine local unions of the district approved the agreement, according to E. M. Royale, district secretary of the International Union of Mine, Mill and Smelter Workers.

James W. Wade, vice president and general manager of the Tintic Standard Mining Company, acting for the operators, predicts that the contract will have a stabilizing influence in the Utah mining industry for the next two years.

The contract, to last until June 30, 1940, replaces an expired agreement that was very similar in form. The main difference is that in the new contract the wage schedule raises minimum levels and extends over working conditions not covered before. The new contract minimum wage is \$4 for smelter workers, \$4.25 for muckers, and \$4.50 for miners, compared with \$3.50, \$3.75, and \$4.25 minimums under the former agreement.

The scales are based on 9-cent copper and a proportionate price in lead. If there is a fall in metal prices, wages will not be cut until operators and employes confer. If the price of copper rises above 10 cents, and lead in proportion, wage increases will automatically take effect.

T. C. I. & R. Recalls Workers

Tennessee Coal, Iron and Railroad Company posted an official notice on August 12 calling approximately 2,000

red ore miners back to work at four of its mines where production had been suspended since June 25. At the same time, Republic Steel Corporation announced night turns were being added at Raymond ore mine and Sayreton coal mines to increase production of raw materials for the Gulf Steel division at Gadsden.

It is estimated that between 5,500 and 6,000 men will have been recalled to work in the district by the end of August.

This movement results from the steady and slowly increasing demand for most of the major steel products produced in the Birmingham district.

Huntress Heads New York Office of Republic Coal and Coke

Republic Coal and Coke Company of Chicago, has announced the initial location of its New York office at 1209 Whitewall Building, under the direction of Carroll B. Huntress as eastern sales agent. Mr. Huntress, just transferred from the management of the Republic Company's St. Louis division, will bring to the company's eastern plant the valuable experience he has accumulated in his years as executive secretary of the National Coal Association and as president of Appalachian Coals, Inc.

Callahan Consolidated Development Under Way

An intensive development campaign is now under way at the property of the Callahan Consolidated Mines, Inc., according to a recent announcement of the mine officials. The company owns large holdings in the Nine Mile district, a consolidation of several important groups from which more than \$2,000,000 in lead-zinc-silver shipments have been made in past years.

Included in the holdings is the Rex mine, one of the large producers in the district some years ago when lead and zinc brought higher prices. Plans of the management call for the opening of the Rex vein at greater depth and a reopening of several levels of the main shaft where extensive ore bodies are known to exist.

The property is located within 8 miles of Wallace, Idaho, adjacent to the famous Interstate-Callahan, Tamarack and Custer, and Hercules mines,

in an area noted for its rich and extensive ore bodies. A new road has been completed to the mine, replacing one that was damaged by flood earlier this spring.

Officers of the company, well known in mining circles of the northwest, include Donald A. Callahan, president; Dr. T. R. Mason, vice president; L. E. Whicher, and Judge William McNaughton.

Illinois Mineral Industries Conference Postponed

The sixth annual Illinois Mineral Industries Conference, previously scheduled to be held at Urbana on September 30 and October 1, has been postponed so as to coincide with the date of dedication of the Natural Resources Building to be constructed soon on the University of Illinois campus, by the Department of Registration and Education and the Public Works Administration.

The State Geological Survey, the College of Engineering, and the Illinois Mineral Industries Committee, sponsors of the conference, have concluded that it will be wise to postpone the meeting until some time in 1939, because of the necessity of concentrating attention on details concerned with the

design and plans for the new building.

The structure will house the State Geological and Natural History Surveys and will be erected at a cost of \$545,000. Approval of a PWA allotment of \$245,000 for the project was recently announced by the Geological Survey. This amount will be joined with a \$300,000 appropriation previously made by the State Legislature, for construction of the combined office and laboratory building, which will serve as headquarters for the two scientific surveys and add greatly to their facilities for research and service.

Arizona Small Mine Operators Meet

Arizona mining men and those interested in mining gathered in Prescott August 25, 26, and 27 for the Big Jamboree of Arizona Small Mine Operators, which proved to be one of the liveliest mining sessions held locally in many years. The Association of Small Mine Operators has grown by leaps and bounds since its organization last February.

Following two days of business sessions, at which delegates from councils and units throughout the State formulated the policies of the State Association, members joined for a complete day on Saturday devoted to mining

and the fun that goes with it. Distinguished speakers who addressed the members on various subjects at the morning and afternoon sessions included:

Julian D. Conover, Secretary of the American Mining Congress — Federal Mining Legislation.

Carl F. Hayden, Senator from Arizona—National Legislation Program.

Thomas E. Campbell, Chairman of Mining Exhibits, Inc., San Francisco— Mining at the Golden Gate Exposition,

James P. Boyle, Tucson—Arizona Politics and Mining.

Herbert Smith, State Senator, Kingman—State Legislation Pertaining to Small Mines.

Howard Kegley, President, Southwest Mining Association, Los Angeles—Cooperation in Solving Mining Problems.

Following the speaking program, one of the most unique parades ever staged wended its way along the streets of Prescott, famous for their early mining history. Present-day prospectors and their burros—men who today are actually working in the hills—were a feature of the parade.

Arrangements for the program were made by Charles F. Willis, State Secretary of the Association; entertainment features were in the hands of Mr. and Mrs. Lester Ruffner, Gary O. Vyne, and R. E. Moore.

QUESTIONS ON THE WAGE-HOUR BILL ANSWERED

WITH provisions of the Wage-Hour bill due to go into effect less than two months hence, keen interest has been manifested in the simple explanation of the rudiments of the bill, by means of questions and answers, that was published in the July, 1938, "Labor Information Bulletin."

Important facts of interest to mining, not included in the discussion, but which are apparent upon careful study of the Act are: (a) That neither the Administrator nor the industry committees have power under the Act to hasten the lowering of maximum hours below the 44 prescribed for the first year, 42 for the second year, and 40 thereafter; and (b) that the Administrator is not empowered to rule as to whether or not employes are engaged "in commerce or in the production of goods for commerce" and are therefore subject to provisions of the

Act. With reference to the latter, the Administrator may possibly express an opinion, but this would not be binding in any court decision concerning the question.

Questions and answers reproduced from the Bulletin are as follows:

Workers Covered by the Fair Labor Standards Act

1. What Groups of Workers Are Covered by the Law?

Workers employed in industries engaged in interstate commerce or in the manufacture of goods shipped in interstate commerce are covered by the Fair Labor Standards Act of 1918.

2. What Employes Are Exempt from the Wage and Hour Provisions of the Law?

The wage and hour provisions of the law do not apply to-

(a) Workers employed in a bona fide executive, administrative, or professional capacity, workers engaged as outside salesmen, and employes in retail and service establishments, the greater part of whose business is within the State; (b) workers employed as seamen, employes engaged in the transportation of persons and mail by air, employes of suburban or interurban electric street railways, and employes of local trolley or motorbus carriers; (c) agricultural workers and those engaged in fishing, including the canning, packing, marketing, and distributing of fish and other sea foods; (d) workers employed in connection with the publication of weekly or semi-weekly newspapers with a circulation of less than 3,000, the major part of which is within the county where it is printed and published; and (e) workers engaged in handling, packing, storing, ginning, compressing, pasteurizing, drying, preparing in a raw or natural state, or canning any agricultural commodity for marketing, or in making cheese or butter if employed within the area of production of the raw materials.

Provisions for Maximum Hours

3. What Are the Maximum-Hour Provisions of the Law?

The law provides a maximum workweek of 44 hours during the first year of its operation, 42 hours during the second year, and 40 hours after the law has been in effect 2 years.

4. Is Overtime Work Permitted?

Yes, but workers are entitled to receive compensation at the rate of not less than one and one-half times their regular rate for all hours in excess of the maximum permitted by law.

5. Are Any Industries Exempt from Paying Overtime for Hours or Work in Excess of the 44, 42, and 40 Maximums?

Yes, the law makes the following specific exemptions:

- (a) An employer and the representatives of his workers who are certified as bona fide by the National Labor Relations Board may agree to arrange the working schedule of the plant without regard to the maximum-hour and overtime provisions of the law, provided that no worker in the plant shall be employed for more than a total of 1,000 hours in any period of 26 consecutive weeks or 2,000 hours in any period of 52 consecutive weeks. However, work in excess of 12 hours a day and 36 hours a week must be compensated at the rate of not less than time and one-half.
- (b) In industries designated by the Administrator as seasonal, workers may be employed up to 12 hours a day and 56 hours a week for a period of not more than 14 weeks in any calendar year. In these industries also work in excess of 12 hours a day and 56 hours a week must be compensated at the rate of not less than time and one-half.
- (c) Employers engaged in the "first processing" of milk, whey, skimmed milk, or cream into dairy products, in the ginning and compressing of cotton, in the processing of cotton-seed, and in the processing of sugar beets, sugar cane, or maple sap into raw sugar or into syrup, are exempt from the maximum-hour provisions.
- (d) Railway and motorbus and truck carriers regulated by the Interstate Commerce Commission are also exempt.
- (e) Employers engaged in the first processing of, or in canning, perishable fresh fruits or perishable or seasonal fresh vegetables, or in the first processing within the area of production of any agricultural or horticultural commodity during seasonal operations, and employers engaged in handling, slaughtering, or dressing poultry or livestock are exempt from the maximum-hour provisions of the law for a period of not more than 14 weeks during a calendar year.

Provisions for Minimum Wages

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6. What Are the Minimum Wages Provided by the Law?

After October 24, 1938, no employer subject to the law will be permitted to pay an hourly wage rate of less than 25 cents or less than the rate fixed by order of the Administrator, whichever is the higher.

After October 24, 1939, no employer subject to the law will be permitted to pay an hourly wage rate of less than 30 cents or less than the rate fixed by order of the Administrator, whichever is the higher.

After October 24, 1945, or 7 years from now, no employer covered by the law will be permited to pay an hourly wage rate of less than 40 cents unless it can be shown by a preponderance of evidence that such rate would substantially curtail employment in the industry concerned.

7. Can an Order of the Administrator Establish a Minimum Wage of More Than 40 Cents?

No, the Administrator cannot order a minimum wage of more than 40 cents an hour.

8. Must Workers in All Industries Wait 7 Years for the Highest Minimum Hourly Wage Rate?

No, the Administrator is required to establish as quickly as feasible the highest minimum wage possible for each industry.

What Procedure Must Be Followed to Establish the Highest Minimum Wage for an Industry?

The Administrator must appoint for each industry an industry committee consisting of an equal number of representatives of employers, workers, and the public. After careful study of the industry and its problems, with due regard for the economic and competitive conditions in the industry, the committee must recommend to the Administrator the highest minimum wage for the industry possible without substantially curtailing employment within the industry.

 Can an Industry Committee Recommend Different Minimum Wage Rates Within an Industry?

Yes, the industry committee may recommend reasonable classifications within an industry and recommend separate minimum wage rates which must be the highest for each classification without substantially curtailing employment in that classification and without siving a competitive advantage to any group in the industry. No minimum wage rates can be fixed solely on a regional basis or on the basis of age or sex of employes. The industry committees and the Administrator are required to consider among other relevant factors the following:

- (a) Competitive conditions as affected by transportation, living, and production costs.
 (b) The wages established for work of like or comparable character by collective labor agreements negotiated between employers and employes by representatives of their own choosing.
- (c) The wages paid for work of like or comparable character by employers who voluntarily maintain minimum-wage standards in the industry.
- 11. Must the Administrator Accept the Recommendations of the Industry Committee?

No, if after a public hearing and opportunity for interested parties to be heard the Administrator finds that the recommendations of the committee are not justified, he may reject them and either refer the question back to the same committee for further study or appoint a new industry committee.

12. Can the Administrator Establish a Minimum Howly Wage Rate Other Than That Recommended by the Industry Committee?

No, all wage orders must be based upon recommendations of an industry committee.

13. Do the Minimum Wage Rates Apply to Apprentices and Learners?

No, learners and apprentices, persons handicapped by age or physical defects, and messengers employed exclusively in delivering letters and messages are exempt from the application of the minimum-wage provisions of the law under conditions determined by the Administrator.

Child-Labor Provisions

14. How Are Children Protected by the Fair Labor Standards Act?

No producer, manufacturer, or dealer can ship or deliver for shipment in interstate

commerce goods produced in establishments where oppressive child labor conditions have prevailed within 30 days prior to shipment.

15. What Is Oppressive Child Labor?

Oppressive child labor means the employment of children under 16 years of age, and the employment of minors of 16 to 18 years of age in occupations found and declared hazardous by the Chief of the Children's Bureau. An employer may protect himself from the illegal employment of minors by securing employment certificates issued in accordance with regulations established by the Children's Bureau of the U. S. Department of Labor.

16. What Occupations Are Specifically Exempt from the Child-Labor Provisions?

Children under 16 employed in agriculture when not legally required to attend school, children employed as actors in motion picture or theatrical productions, and children working for their parents in any occupation other than manufacturing or mining are exempt.

17. Are There Other Regulations Pertaining to the Employment of Children?

Yes, children between 14 and 16 years of age may be granted permits for work in occupations other than manufacturing and mining if the Chief of the Children's Bureau finds that such employment will not interefere with their schooling or impair their health and well-being.

18. Are Children Employed in Intra-State Commerce Covered by the Law?

No, children employed in local trades and services who constitute nearly three-fourths of the total number of minors employed in the United States are not covered by the law.

Administration and Enforcement

19. How Will the Law Be Administered?

The Fair Labor Standards Act creates within the Department of Labor a Division of Wages and Hours in charge of an Administrator appointed by the President of the United States subject to the approval of the Senate. The child labor provisions of the Act will be administered by the Children's Bureau of the U. S. Department of Labor.

20. What Penalties Are Provided for Violations of the Law?

Employers who willfully violate the wage and hour provisions of the law or the wage orders fixed by the Administrator will be prosecuted in the courts and are subject to a fine of not more than \$10,000 or imprisonment for not more than 6 months or both, provided, however, that no person can be imprisoned for a first offense.

21. Can Workers Collect the Difference Between the Legal Minimum Wage and the Amount They Have Actually Been Paid by Employers Violating the Law?

Yes, employes, individually or through representatives, can institute court proceedings to collect the difference in wages to which they are entitled due to violations of the law and an equal amount as damages. The employer is also liable for the costs involved in prosecuting the case.

22. Are Workers Protected If They Report Violations of the Law or Testify Against Their Employer?

Yes, employers are prohibited from willfully discharging or in any other manner discriminating against employes who serve on industry committees or who file complaints or testify on alleged violations of the law.



H. T. DEBARDELEBEN, president, DeBardeleben Coal Corporation, was the principal speaker at a meeting of the Alabama Farm Federation at Auburn, Ala., August 5. Mr. DeBardeleben stressed the importance of the coal industry to farming interests of the State, and emphasized the plans being made by the recently formed Alabama Coal Trade Extension Association to combat the use of competitive fuels and find other markets to bring about a marked improvement over present conditions in the industry.

W. R. Phibbs has been appointed assistant to the president of Jones and Laughlin Steel Corporation. He has been with the company since 1936, engaged in special work. Formerly general manager of the Columbia Steel Company, San Francisco, Mr. Phibbs' entire business experience has been in the iron and steel industry.

JOHN L. STEINBUGLER, Washington, D. C., has received a temporary appointment as special advisory counsel in the legal division of the National Bituminous Coal Commission. He was formerly counsel to District Producers Board No. 7. Mr. Steinbugler takes up his new duties at once and will assist in the forthcoming price establishment procedure. He served as volunteer acting counsel for a short time after the Commission was first organized.

BENJAMIN SCHWARTZ, former director general of the Institute of Scrap Iron and Steel, became vice president of Schiavone-Bonomo Corporation on August 15. Mr. Schwartz organized the institute 10 years ago and has served as its chief executive since is inception. EDWIN C. BARRINGER, former editor of the Daily Metal Trade, was appointed executive secretary of the institute to take over the duties vacated by Mr. Schwartz.

HEWITT SMITH, formerly superintendent of the Kelleys Creek Colliery Company, Ward, W. Va., has been made superintendent of the Micco mine of the West Virginia Coal and Coke Corp., Micco, W. Va.

ROY B. EARLING has been elected vice president and general manager of the United States Smelting Refining and Mining Company, in charge of the extensive operations basing at Fairbanks, Alaska. He will continue to make his home at that locality.

Before going to Fairbanks in 1927,



ROY B. EARLING

Mr. Earling was employed by the company for several years in the Nome area, where he served in the capacity of consulting engineer for two seasons. In 1928 he was promoted to assistant general manager at Fairbanks, and in 1936 he succeeded O. J. Egleston as general manager.

C. W. CRUMB was appointed central division sales manager for Oliver United Filters, Inc., with headquarters at 221 North La Salle Street, Chicago, Ill. Mr. Crumb has been connected with Oliver United for the past 11 years as sales engineer. His new appointment was effective August 1.

D. A. CALLAHAN, attorney and prominent mining man of Kellogg, Idaho, was an easy winner in the Idaho Republican primary for United States Senator. His Democratic opponent in the November election will be Congressman D. Worth Clark, who, running as a conservative Democrat, administered a hard blow to the New Deal by defeating the 100 percent New Dealer, Senator Pope.

R. C. KLINGENSMITH has been appointed superintendent of the Eagle mine, Getty Coal Company, at Hepzibah, W. Va.

James O. Grennan, mining engineer who formerly operated in Nevada as mine owner and manager, and who is widely known in the state, arrived in Reno with his daughter recently, after spending about 8 years in the Philippines and other foreign countries in the pursuit of his profession. He intends to follow mining in the state once again, having an interest in Nevada and Idaho properties. While in the Philippines, Grennan served as superintendent of the Benguet Consolidated Mining Company.

J. F. KLANER, JR., is now president of the Alston Coal Company, Kelly-Carter Coal Company, and Windsor Coal Company, with headquarters in Pittsburg, Kans. Operations of the company are in Kansas and Missouri. Mr. Klaner was formerly vice president, and in his new position he succeeds the late J. F. KLANER.

W. H. COGHILL, metallurgist with the United States Bureau of Mines, Rolla, Mo., is now at the Bureau's southern experimental station at the University of Alabama, Tuscaloosa.

FRED FLINK has been named superintendent of the Judd iron mine of the Charleson Iron Mining Company, Bovey, Minn. Mr. Flink succeeds the late W. W. Schwarz.

G. C. EARL, engineering executive of Utah Copper Company for nearly 30 years, was recently appointed chief engineer for the company, succeeding the late H. C. GOODRICH.

GEORGE E. BAYLES is now employed as preparation engineer for the Nellis Coal Corporation, at Nellis, W. Va. He assumed his new duties on August 1.

JOHN C. Cosgrove, Jr., of Johnstown, Pa., who recently graduated in mining engineering at the Pennsylvania State College, is now employed as junior engineer for the Koppers Coal Company at Mt. Hope, W. Va. He assumed his new duties on August 1.

AUGUST GRUNERT has succeeded FREDERICK C. GILBERT as secretary of the Mining Association of Montana. Mr. Gilbert, formerly on the faculty of the Montana School of Mines, moved to Helena recently to become director of the Montana State Employment Service.

ROBERT DICKSON, formerly safety director, Kelleys Creek Colliery Company, Ward, W. Va., has been appointed director of safety for the West Virginia Coal and Coke Corporation, Omar, W. Va.



R. E. SALVATI

R. E. SALVATI, general manager of the Island Creek Coal Company, was recently named vice president and general manager of the company. Starting his work with the company as a trackman, he has risen steadily to positions of greater responsibility. He is also vice president in charge of operations and general manager of the Pond Creek Pocahontas Company.

ALBERT M. NASH, mining engineer, has been elected president and manager of the Hope Silver Lead Mines, Inc.,

owner of the Hope mine at Clark Fork, Idaho.

Dr. James Gilluly, geologist with the United States Geological Survey, who for the past two years has been in charge of survey work in the Tombstone, Ariz., area, has been appointed head of the Department of Geology at the University of California at Los Angeles. He will assume his new duties on September 1.

JOHN T. SYDNOR, recently made manager of mines, West Virginia Coal and Coke Corporation, has been elected vice president of the company. Mr. Sydnor will serve as vice president and manager of mines.



JOHN T. SYDNOR

GEORGE WATKIN EVANS has returned to his Seattle office from a professional visit to the Caribou district in British Columbia.

-Obituaries-

ADOLPH LEWISOHN, well-known mining executive, investment broker, and philanthropist, died August 17 at his summer home on Upper Saranac Lake, N. Y., aged 89.

Mr. Lewisohn was a native of Germany, having come to this country 68 years ago. At the time of his death he was president of the firm of Adolph Lewisohn and Sons, in New York City, and headed numerous mining concerns, including the Tennessee Corporation, the Central Development Company, Miami Copper Company, and the South American Gold and Platinum Company.

FRANK J. TUITE, widely known engineer with the Robins Conveying Belt Company in the eastern half of the United States, died on July 20. Mr. Tuite had been a member of the engineering and sales departments of the company for more than 25 years.

M. J. HARTNEADY, secretary of mines in the cabinet of Governor George Earle, of Pennsylvania, and president of District 7 of the United Mine Workers of America for 26 years, died at his home in Nesquehoning, August 12, following a heart attack. He was 59 years old.

As a district leader of the miners, Mr. Hartneady played an important role in the industry's history for a quarter of a century, during which time he helped to negotiate important agreements between the union and the operators. He resigned his mine post to enter Governor Earle's cabinet.

H. M. WILCOX, manager of the new products division of Westinghouse Electric and Manufacturing Company, died suddenly from heart disease on July 28 while in New York City on business.

ALBERT E. JURE, chief geologist of the Consolidated Mining and Smelting Company, with headquarters at Kimberley, British Columbia, died suddenly August 12.

GEORGE F. RUCH, assistant to the president, the H. C. Frick Coke Company, died in Pittsburgh early in August at the age of 40. He had been a resident of Pittsburgh for the last 15 years.

CHESTER C. SHINN, in active charge of district sales of the Consolidation Coal Company at Fairmont, W. Va., for the past 12 years, died in Philadelphia on July 25, following an operation for cerebral tumor. Mr. Shinn was widely known in coal circles of northern West Virginia, and had long been in the continuous employment of the Consolidation Coal Company and its predecessors.

CHARLES W. BAKER, former president and chairman of the board of the American Zinc, Lead and Smelting Company, died August 9 in New York following an illness of two months. He was 75 years old.



THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

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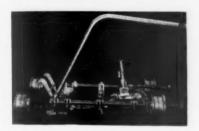
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Pi el th sie

MANUFACTURERS' Forum

Portable, High Speed Electric Rail Drill

Development of a portable, powerdriven rail drill has been announced by the Ohio Brass Co., Mansfield, Ohio. This rail drill, adjustable for all weights of rail, was especially developed for drilling holes to accommodate the terminals of O-B's new wedge



bond. The device is regularly available for line voltages of 250 volt and 600 volt d.c., and is equipped to handle both 1/8- and 1/4-inch drill sizes. The motor is a standard 1-inch drill motor. The drill rides along the rail on four wheels and may be conveniently operated in low-seam coal.

Permissible Type Motor

The Louis Allis Co., Milwaukee, Wis., announces a brand new line of permissible type D.C. Explosion-Proof electric motors. The company states that the very first fan-cooled explosion-proof motor was originated, developed, pioneered and patented by them—and this new line of permissible type motors incorporates the very



SEPTEMBER, 1938

G

latest advancements in this type motor

These new motors have been specially designed to withstand the toughest usage in gaseous mines—and are designed to deliver dependable performance with a greater margin of safety than can ever be required of them. They have been inspected and explosion-tested by the Bureau of Mines laboratory and have also been tested, listed and approved by the Under-vriters' Laboratories.

Eighteen separate and distinct improved features are illustrated and described in the new bulletin the company has published. Write The Louis Allis Co., Milwaukee, Wis., and ask for copy of bulletin No. 520, and one will be sent to you promptly.

Radically New Core Drill Bit

The Sullivan Machinery Company has released literature descriptive of a new revolutionary type of core drilling bit known as the Koebelite Korbit. In terms of bit cost per foot of hole drilled, savings of 15 to 20 percent are claimed in comparison with any other type of bortz set core drill bit. Faster drilling speed and greater footage per bit are also claimed.

Koebelite Korbits consist essentially of a number of bortz-bearing inserts accurately located and firmly brazed into radial slots in the face of the bit blank

By means of an ingenious process developed and patented by C. J. Koebel of Detroit, U. S. A., the stonebearing insert or metal matrix and the stones are molded and integrally bonded together. Even temperature changes cannot affect this bond. Because the stones are set in the inserts with mechanical precision and in accordance with a definite field proved pattern, and because the inserts are located with close limit gauges, an absolutely uniform contour gauge is achieved which gives maximum cutting speed and insures straighter hole. These outstanding new bits are available in any style and size.



Copies of descriptive literature can be secured from Sullivan Machinery Company, Michigan City, Ind.

Improved Pulverators

The Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, for many years manufacturers of Pulverators (hammer mills) now announce three new sizes of improved design to supplement their present line. pulverizing chambers of these Pulverators are 24, 36 and 48 in. inside widths. They are designed to reduce the product of primary crushers handling moderately abrasive materials where small products with a maximum of fines are desirable. The pulverizing is by impact on involute liners, a principle which has been used for many years on Allis-Chalmers Pulver-

These new machines are of welded steel plate construction, stress relieved, with wearing surfaces protected by rugged manganese steel liners held in place by lugs on the liners extending through the frame and held securely with keys and setscrews on the outside. This method of securing liners means that there are no bolt heads in the pulverizing chamber subject to wear. The machines are equipped



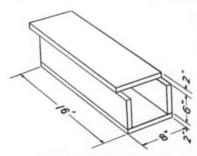
with large anti-friction bearings; the rotor to which the hammers and arms attach is a series of heavy steel discs for flywheel effect. No external flywheels are required.



The Wood Preserving Corporation, Koppers Company subsidiary, now is supplying pressure creosoted wood to mines for a use which has proven successful in other industrial fields.

Efficient and inexpensive drainage ducts are made in sections using pressure creosoted lumber, nailed together to make a simple box. These box sections are joined end to end to form a conduit as long as is desired. Cross drains under the track are installed as needed.

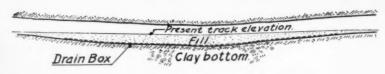
Main haulage mine tracks, built on pressure treated mine ties and laid on dry road beds, have high ton-hour capacity, and result in the maintenance

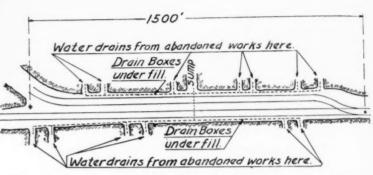


Perspective sketch of drain box

of line and surface at minimum expense. By using preserved wood it is found that the drain boxes and mine ties will not need to be replaced during their required life.

The Crescent Mining Company, Peoria, Ill., has had highly successful results from an installation of this type in its La Marsh No. 1 mine. In





Section and plan showing mine drainage system at the La Marsh No. 1 mine of Crescent Mining Company

this mine were 1,500 ft. of main haulage road which ran through a wet swag. Through this section enough roof was taken to make a fill. The track was raised from 1 to 6 ft. While this filled the sump and leveled the track, it still was necessary to provide for the removal of water which seeped under the fill from old workings.

Accordingly, two drain boxes were installed along each rib for the entire 1,500 ft. They were placed on the old grade line before the track was raised and then covered by the fill. The boxes were made of pressure-creosoted pine lumber in 16-ft. sections using two pieces 2 by 8 by 16 ft. and two pieces 2 by 6 by 16 ft. This inexpensive system drains the water from the old workings to a central sump.

Formerly three haulage motors were needed to pull 1,800 tons of coal over this track during each shift. Since the drainage boxes have been installed and the track raised, two haulage motors now bring out 2,200 tons of coal during each shift. This has resulted in a saving of approximately 5 cents per ton in production costs.

The accompanying cuts show details of the La Marsh No. 1 mine drainage installation.

company's employ since 1911, first serving in the engineering department at the Philadelphia plant. For the last 15 years he has been engaged in the sale of roller chain drives.

Coincidentally with Mr. Bond's promotion, Ralph S. Dyson, for many years manager of stock silent and roller chain drives through distributors, will also head up roller chain sales to duplicate machinery manufacturers. Mr. Dyson entered the company employ in 1899.



New type ratchet rail bender (above) and rail punch (below) recently introduced by Gibraltar Equipment & Manufacturing Co., St. Louis, Mo. New features facilitating their operation have been incorporated in this well known line of "Gemco Tru-Blue" track tools



Link-Belt Promotions

Link-Belt Company announces that William W. Bond has been appointed western sales manager of the positive drive division, with headquarters at the Dodge plant in Indianapolis, to succeed G. Howard Burkholder, deceased. Mr. Bond has been in the

Streamlined Crusher

The Universal Crusher Company, Cedar Rapids, Iowa, has introduced the new No. 2436 "streamlined" crusher with 24 x 36-inch feed opening to meet the demands for a bigger size following wide favor met with the smaller No. 1016 machine.

Like the new No. 1016, this crusher has a one-piece alloy steel base with a smooth exterior, providing approximately 20 percent saving in weight. Reinforcement is provided on the inside.

The entire base is flush at the bottom, providing a firm footing. Other features include six heavy-duty roller bearings, quick acting product size



adjustment and wide feed opening. All major parts are made to be interchangeable with regular models of Universal 24 x 36-inch crushers.

finery, sewage-sludge, producer or any mixture of gases. The bulletin is pro-fusely illustrated with views portraying the wide range of sizes and services of Worthington engines. 36 pages.

• MAGNETIC EQUIPMENT. Stearns Magnetic Mfg. Co., Milwaukee, Wis. Bulletin 25 features the company's line of circular, rectangular and hand magnets. Various users of Stearns suspended magnets are listed, together with illustrations and other descriptive data.

Bulletin 700 describes the type "K" induction separator for concentration of ores, minerals and other materials of high magnetic reluctance. Two new models are pictured, designed for both

models are pictured, designed for both laboratory and commercial use.

- MONEL METAL FOR METERS. national Nickel Co., 67 Wall Street. New York City. Bulletin 59M points out the various advantages in using monel metal construction of different types meters. 8 pages.
- TUMPS Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 1653 presents the company's line of close-coupled centrifugal pumps covering a range of 10 g.p.m. against 10-ft. head to 1,600 g.p.m. with 120-ft. head, and for lower capacities up to 300-ft. head. It also includes capacity tables showing ratings obtainable and recommended motor sizes and speeds for various ratings. 32 pages.
- RESPIRATORY EQUIPMENT. Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh, Pa. Bulletin BM-2 describes, with the help of a number of illustrations, the recently announced M.S.A. Lightweight One-Hour Oxygen Breathing Apparatus. The bulletin clearly sets forth the principal of operation and fields of use of the new product, developed in response to wide-spread requests for an oxygen breathing apparatus retaining the lightweight wearing ease of the well known M.S.A. Half-Hour Unit, but providing respiratory protection for a longer period. 4 pages.
- Scraper Equipment. R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. Form G-1012 points out examples of tractor tool flexibility to meet all stripping, quarrying and aggregates production problems, including actual job stories in picture-captioned style. S pages.

• TAMPING BAG FILLER. The Tamping Bag Co., Mt. Vernon, Ill. Circular presents numerous advantages in filling tamping bags with the "dummy maker" machine, which it is claimed will fill and pack 400 to 600 Seal-Tite Safety Seam Tamping Bags per hour. 4 pages.

The company also announces formation of a new department that will make a specialty of manufacturing armature shafts, axle shafts and other shafting that may be needed. All of their replacement shafts will be made from a special alloy heat-treated stock; after long experimental work the company claims that it can now guarantee these shafts against breakage for five years.

SPEED TRANSMISSION. • Variable Speen Transmission.

Ideal Commutator Dresser Co., 1863
Park Avenue, Sycamore, Ill. Circular describes briefly and illustrates the new ideal "Select-O-Speed," a new type of variable speed transmission. Very inexpensive operation is claimed for the new transmission, which uses only standard "V" belts. It easily gives an infinite selection of speeds over a five to one or greater ratio by simple movement of a control lever. VARIABLE

• Welding Equipment. American Manganese Steel Division, 389 E. 14th Street, Chicago Heights, Ill. Welding bulletin 10A gives suggestions for welding with the Amsco nickel-manganese steel welding rod. 2 pages.

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Completely equipped power plant including one 750 KW and one 1,250 KW General Electric alternating current condensing turbo generator set; five 250 h.p. and three 200 h.p. B&W water tube boilers; good condition. Also numerous other items of coal mine equipment. Mine recently closed.

THE OWL CREEK COAL COMPANY GEBO, WYOMING

CATALOGS and BULLETINS

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- AUTOMATIC TIME SWITCHES, General Electric Co., Schenectady, N. Y. Bulletin 2963 describes Type TSA-14 automatic time switches for control of A.C. or D.C. circuits. 4 pages.
- CARS AND ACCESSORY EQUIPMENT. The Koppel Division of Pressed Steel Car Co., Inc., Grant Building, Pittsburgh, Pa. Bulletin 71 presents a general summary of representative Koppel equipment available in standard designs to facilitate selection of the type of car best suited to individual requirements. Profusely illustrated with all types of cars and accessory equipment produced by the company. 16 pages.
- CIRCUIT BREAKERS. Westinghouse Elec. & Mfg. Co., East Pittsburgh Pa. Descriptive data 33-675 describes, with the aid of illustrations, the type "U" De-ion air circuit breakers, designed for indoor service, especially in generating and industrial plants where reliability under severe operating duty and minimum space is of great importance. The breakers are is of great importance. The breakers are applicable to standard voltage ratings from 2,500 to 15,000 volts, and can be furnished in standard current ratings of 600, 1,200 and 2,000 amperes. 12 pages.
- DRILLS. Ingersoll-Rand Company, Phillipsburg, N. J. Bulletin 2433 presents the company's new JA-35 Jack-hamer, a lightweight yet powerful drill, styled after the widely used JA-45 and JA-55. Weighing less than 35 lbs., it is a light weight, easily held, fast drilling machine that finds application in coal and metal mines, in quarries, and on construction jobs. It is light enough for cutting hitches, trimming, taking up bottom, placing trolley hangers in a mine, popholing and still powerful enough for much general work. Data on other Jack-

hamers are included in the booklet. 8 pages

- ELECTRIC STORAGE BATTERIES. • ELECTRIC STORAGE BATTERIES. The Electric Storage Battery Co., Philadelphia, Pa. Booklet "Fifty Years of Achievement" is a most attractive and informative illustrated volume describing briefly the history of the growth of the Electric Storage Battery Company, and pointing out a few of the most important of the hundreds of diversified applications in which Exide batteries are serving industry and the public today. 36 pages.
- Gas Engine. Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin S-550-B14 presents the company's new type LPE engine, of vertical 4-cycle, multi-cylinder, truck-piston type with cylinders of L-heed design arranged in line. The entire unit is totally enclosed and has full circulating pressure lubrication throughout. Units are available in 4, 6 and 8 cylinder arrangements, conservatively rated at 180, 270 and 360 b.hp. when running at 400 r.p.m.
- GRINDING EQUIPMENT. Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 1467-A illustrates and describes the company's complete improved line of multi-impact pulverators or hammer mills recommended for pulverizing coal, limestone, oyster shells and other non-abrasive materials. 16 pages.

 Denver Fire Clay Co., Denver, Colo. Bulletin 202 presents the construction features and operating advantages of the new DFC pulverizer. 8 pages.

• Internal Combustion Engines. Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin S-500-B13 portrays the extensive application of deisel and gas engines in every field where power is an essential factor. Worthington deisel engines are of the heavy duty type, ranging from 50 to 1,500 hp. at speeds from 225 to 600 r.p.m. The company's line of gas engines range in size from 30 to 1.800 hp., and are designed to operate on natural, manufactured, re-

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installations in mines.

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MINING CONGRESS JOURNAL

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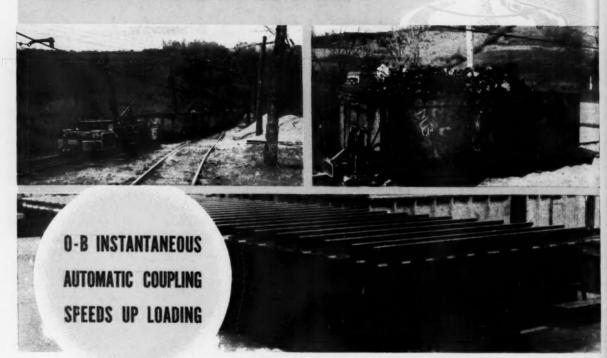
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Does your loading machine empty into a BOTTLENECK?



Showing present installation of the O-B Automatic Mine Car Coupler. Industrial managements will be interested in the lower illustration showing the coupler in service on a transfer car at the Irvin Works of the Carnegie-Illinois Steel Corporation.

O-B Automatic Coupling Gives You These Money-Saving Advantages . . .

- Faster Loading—Instantaneous coupling makes capital of loading machine speed.
- 2 Safety—Eliminates necessity to go between cars. No accidents or fatalities.
- 3 Multiplies Car Life—spring-cushioned coupler absorbs shocks. No distorting corner blows. Less time in repair shop and maintenance costs go 'way down!
- 4 Faster Haulage—Rigid beam connection keeps train in alignment and results

- in smoother riding, permitting faster haulage speeds. No spilling of coal.
- 5 Reduces Motor Strain—No-slack feature of coupler eliminates backlashing and pounding—train stops and starts smoothly.
- 6 Permits Rotary Dumping Without Uncoupling—Individual dumping of cars is also facilitated.
- 7 Wide Gathering Range—Permits automatic coupling on vertical and horizontal curves. Centering device maintains coupler heads in central position at all times.



